



# **An Inventory of the Vascular Flora of Fort Greely, Interior Alaska**

Charles Racine, Robert Lichvar, and Michael Duffy

February 2001

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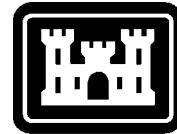
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Charles Racine, Robert Lichvar, and Michael Duffy

February 2001

Prepared for  
U.S. ARMY ALASKA

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## **PREFACE**

The report was prepared by Dr. Charles Racine, Ecologist, Geological Sciences Division, Robert Lichvar, Ecologist, Remote Sensing/GIS Center, and Michael Duffy, contract employee, U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire.

Little or no direct funding for this floristic project was provided and it was accomplished as part of an Ecological Land Survey project (Racine) and Wetland Delineation (Lichvar) for Fort Greely. Funding for these latter studies was provided by the U.S. Army ITAM (Integrated Training Area Management) program through U.S. Army Alaska, Fort Richardson, Department of Public Works, Natural Resources Division, where William Gossweiler and Gary Larsen supported this work.

Martha Reynolds also contributed to this report; technical review was provided by Peggy B. Robinson and Beth Astley.

Several groups on Fort Greely gave assistance by providing their time and experience to familiarize the authors with the natural features of the base, and helped in providing logistical support, such as laboratory space, transportation, and lodging. The Land Condition Trend Analysis group at Fort Greely, headed by Ellen Clark, was particularly helpful. The flight control crews at Allen Airfield (LTC Michaud, CW2 Gorczok, CW3 Isbill, and SSG Jackson) worked under extreme weather and scheduling conditions to provide helicopter support for the Molybdenum Ridge and other surveys west of the Delta River. Torre Jorgenson, Joanna Roth, Barbara O'Donnell, and other ABR, Inc., staff provided much insight and many contributions to the inventory. Barbara O'Donnell assisted in the Molybdenum Ridge inventories. Dale Yokum (U.S. Army Engineer Research and Development Center, Environmental Laboratory, Vicksburg, Mississippi) also assisted with field plant collections. Botanists at the University of Alaska Fairbanks Museum-Herbarium (Carolyn Parker, Alan Batten, Dr. David Murray, and Dr. Elena Conti) provided consultation and support, as well as Emily Bell and other staff at the Gray Herbaria, Cambridge, Massachusetts.

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# An Inventory of the Vascular Flora of Fort Greely, Interior Alaska

CHARLES RACINE, ROBERT LICHVAR, AND MICHAEL DUFFY

## INTRODUCTION

Beginning in 1994, we (C. Racine and R. Lichvar) initiated floristic inventories of the three U.S. Army bases in Alaska (Forts Richardson, Wainwright, and Greely). These studies were designed to support various Army natural resource programs, including ITAM (Integrated Training Area Management) and LCTA (Land Condition Trend Analysis), as well as to provide information for the *Endangered Species Act* (ESA), the *National Environmental Policy Act* (NEPA), and AR 420-74, *Natural Resources-Land, Forest and Wildlife Management*. The inventory reports for Forts Richardson and Wainwright have been issued as USACE reports (Lichvar et al. 1995, Racine et al. 1997). This is the third and final report in this series. The inventories provide a record of the plant biodiversity in three different northern environments from coastal mountains (Fort Richardson) to interior lowlands, uplands, montane, alpine, and riverine habitats (Forts Wainwright and Greely).

As mentioned, this study provides an inventory and analysis of the existing vascular flora of Fort Greely. Additional objectives include:

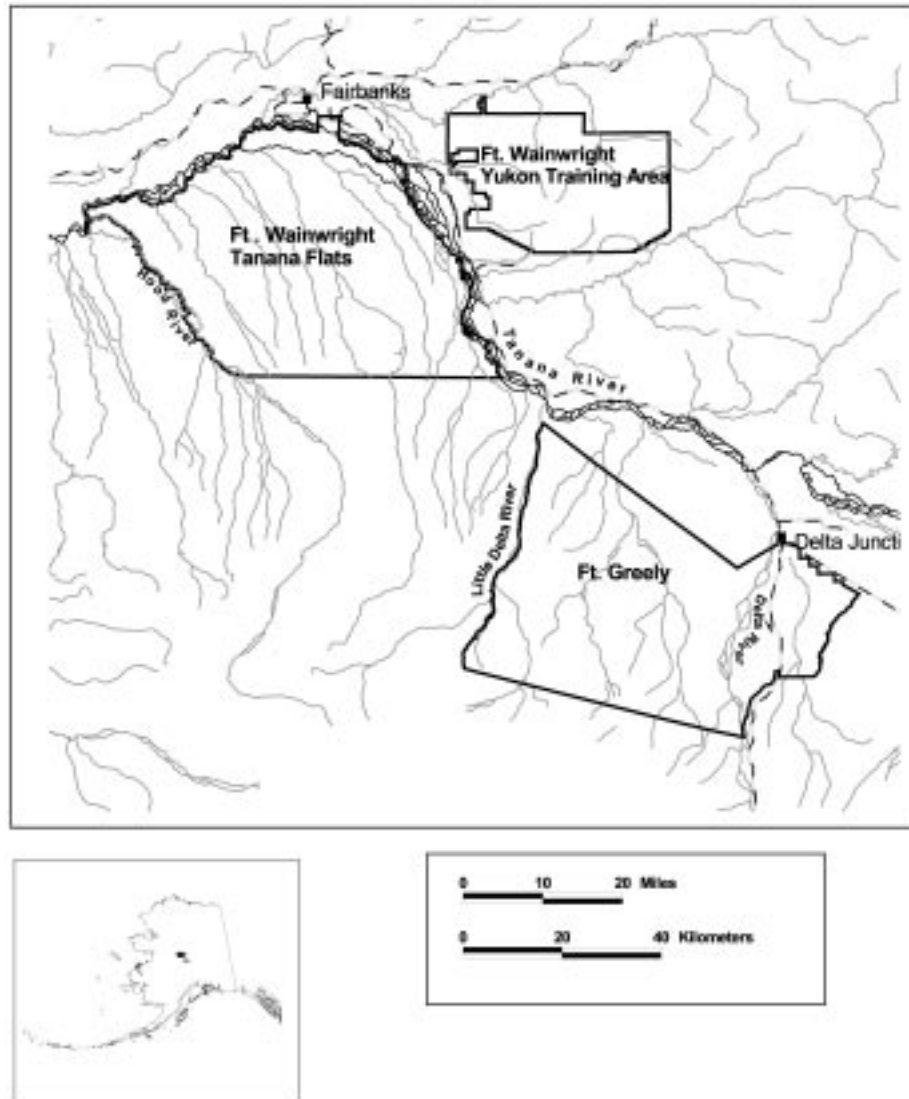
- Compile a preliminary list of potential species that might occur on Fort Greely from herbarium and literature sources.
- Subdivide Fort Greely into floristic inventory areas to provide for representative collections from all parts of the facility.
- Collect sets of all voucher vascular plant specimens and provide a set for Fort Greely.
- Identify the specimens collected in the field to the appropriate subspecific level and have final verification of specimens done by specialists at the University of Alaska Museum and other herbaria.

- Provide species lists for Fort Greely to include relationships to species on Fort Wainwright, floristic regions, habitats, range extensions, and rare species.

## STUDY AREA

Fort Greely is located southeast of Fairbanks near Delta Junction, Alaska, in Interior Alaska (Fig. 1) between the Alaska Range and the Tanana River. The base covers about 231,479 ha (0.66 million acres). Three large rivers and a tributary to one of these, fed by glaciers in the Alaska Range, flow from south to north across the base and empty into the Tanana River (Fig. 2). Elevations range from about 400 to 1800 m. The base covers portions of the Big Delta and Mt. Hayes USGS quadrangles.

According to Jorgenson et al. (2001), the base originated as Station 17, Alaska Wing of the Air Transport Command, in 1942 to serve as a refueling stop and was reduced to inactive status in 1945. In 1948 the installation was reactivated for cold weather maneuvers, and it was named the Arctic Training Center in 1949. Most of the facilities were constructed during the 1950s, including the military's first nuclear power plant. Chemical and biological weapons were tested during the 1950s. Studies of Fort Greely vegetation and flora were conducted by Holmes and Benninghof (1957) who collected about 400 species of vascular plants. Under the BRAC-1995, Congress designated a portion of the Main Post to be closed and training activities to be realigned with Fort Wainwright. Fort Greely currently is used for artillery, mortar, and small arms firing, aerial gunnery, and platoon to brigade exercises and bivouacs because of the large area and the unique opportunities for cold weather testing, glacier training, mountaineering, river rafting, and ice-bridge construction. The U.S. Air Force



**Figure 1. Fort Greely and Fort Wainwright military installations.**

is a major user of Fort Greely and has delineated the Oklahoma/Delta Creek Impact Areas as the primary sites of military aircraft training. About 62,720 ha (156,800 acres) or 25% of the entire base is used as an Army artillery and Air Force impact area (Fig. 2)

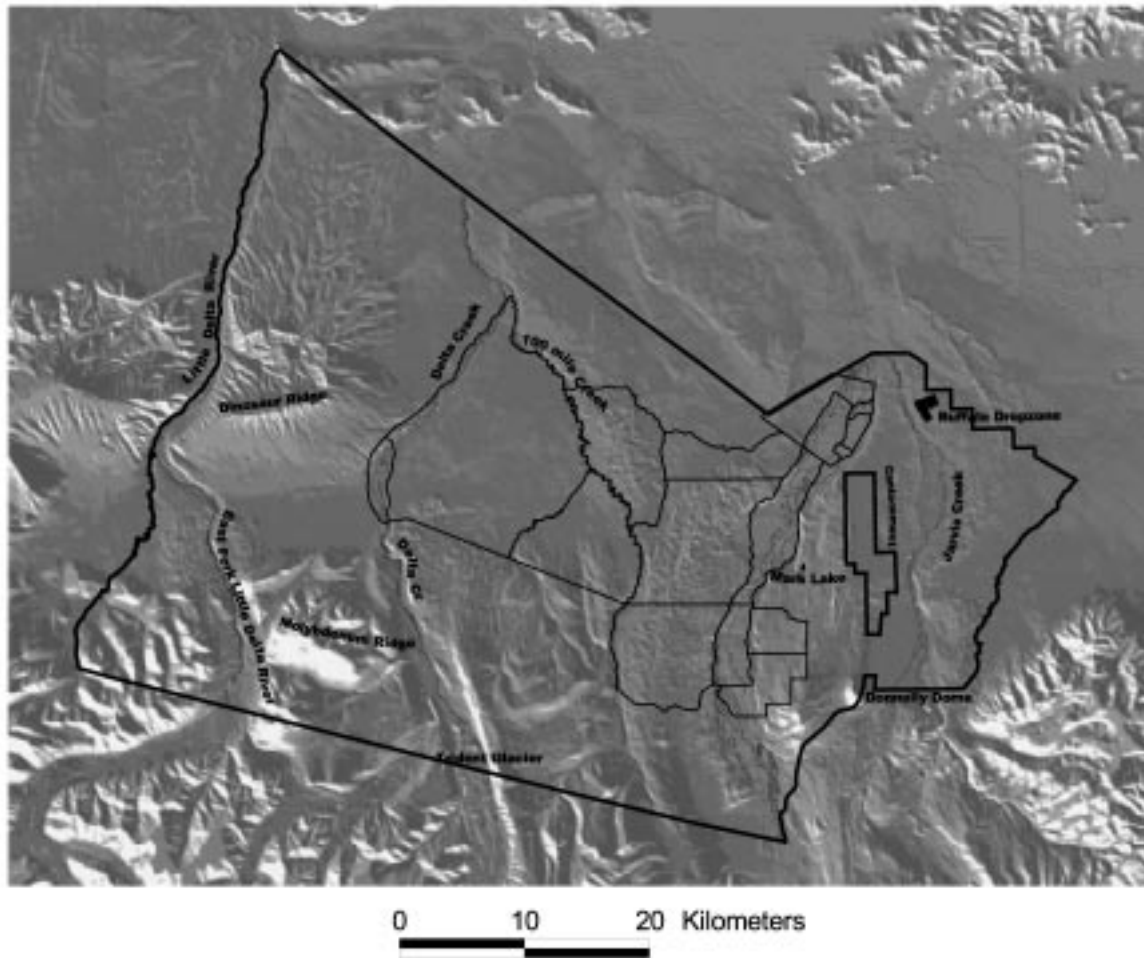
### **Climate**

The continental climate of interior Alaska has extreme annual temperature variations and relatively low precipitation. Although light winds are typical over much of the interior region, Fort Greely experiences strong gusty winds, particularly from the south (Benson 1972). According to U.S. Weather Bureau records (1937–98), the mean annual temperature is  $-2.3^{\circ}\text{C}$ , with extremes ranging from  $-51$  to  $38^{\circ}\text{C}$  (Nelson 1995). The mean monthly temperature is  $15.6^{\circ}\text{C}$  for July and

$-19.9^{\circ}\text{C}$  for January. The average annual precipitation is 297 mm and annual snowfall averages 178 cm.

### **Geomorphology and vegetation**

Jorgenson et al. (2001) described and mapped the geomorphology, vegetation, and ecosystems of Fort Greely using an Ecological Land Classification approach. They mapped geomorphic units, with 22 of them being fluvial, 3 being eolian, 4 being glacial, and 5 being organic classes. Glacial and eolian processes dominate, with the earlier Delta glaciation and the later Donnelly glaciation producing the moraines and associated deposits of eolian sediments (Church et al. 1965, Péwé and Reger 1983). Jorgenson et al. (2001) also mapped five ecodistricts (Fig. 3) on the basis of physiography and climate associated with topography. Moun-



**Figure 2. Topographic features of Fort Greely roads, cantonement (outlined), and impact areas.**

tain areas (Hayes Mountain, Gakona Mountains) were above 900 m where treeline occurs, Highlands (Delta Highlands) ranged from 600–900 m, while lowland areas (Delta Lowlands) were below 600 m. The four large floodplains crossing the base from south to north are mapped as the Middle Tanana Floodplain.

Jorgenson et al. (2000) classified and mapped 37 local ecosystems on the basis of a combination of physiography (i.e., alpine, lowland, riverine, etc.), moisture status, soils or substrate, and dominant vegetation growth form: 12% of the area is occupied by Alpine ecosystems (i.e., Alpine Rocky Moist Low Scrub), 20% by Upland ecosystems (i.e., Upland Moist Low and Tall Scrub), 55% by Lowland ecosystems (with Lowland Tussock Scrub Bog being the most common type covering 21% of the base), and 8% by Riverine ecosystems (i.e., Riverine Gravelly Barrens).

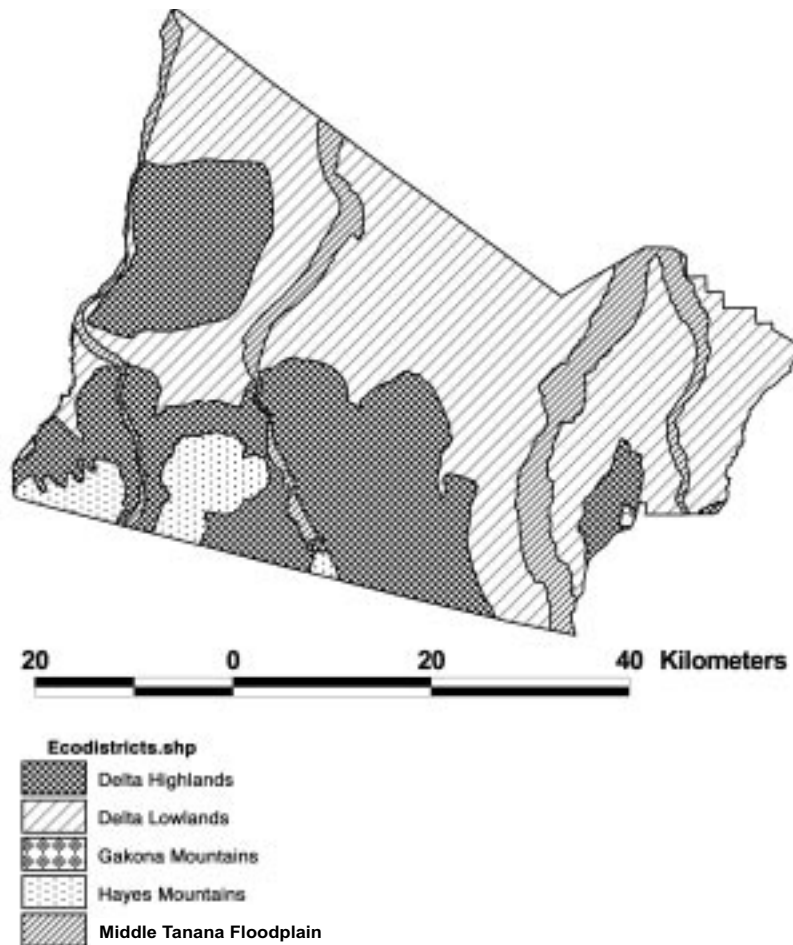
### Habitats

Plant species are associated with particular habitats and communities that are determined by the soil mois-

ture, soil chemistry and texture, temperature, wind, and snow cover. The most extreme habitats of wetness or dryness, or those with the lowest temperatures, often contain unique assemblages of species.

### Floodplains

Braided river drainages are an important feature of the base (Fig. 4a). The more stable margins were dominated by tall alder and willow scrub communities, and large areas of open gravel bar were dominated by *Dryas drummondii*, legumes such as *Hedysarum* sp. and *Oxytropis* sp., and low scrub such as *Salix glauca* and *Elaeagnus commutata*. The endemic willow *Salix setchelliana* was found at most open gravel bar sites. Wet to moist, fairly stable sedge-forb meadows (such as site 38) were not common, though the vast majority of the Delta River Bar was closed because of unexploded ordinance and could possibly contain more of this species-rich habitat. Wind blown sand, encroaching on neighboring forest and scrub, was encountered on portions of Jarvis Creek.



**Figure 3. Major subdivisions of Fort Greely (ecodistricts) based on physiography from Jorgenson et al. (2000).**

### Forests

Large mosaics of closed and open-canopy broadleaf forests of aspen and paper birch, and mixed white spruce–broadleaf forests, cover much of the northeastern section of the base (Fig. 4b). White spruce–lichen woodlands covered large areas of the Jarvis Creek lowlands in the southeast. Lowland forests and woodlands were represented by balsam poplar stands in well-drained alluvium, white spruce forests on well-developed mesic terraces and some moraines, and black spruce muskegs at poorly drained sites. Tamarack was present but not found to be a major component of lowland areas.

### Burns

Both uplands and lowlands have been greatly influenced by fire (Fig. 4b). Jorgenson et al. (2001) estimated that 59% of Fort Greely (153,812 ha) has been burned since 1950, although a substantial portion of

this burned area has burned more than once. Many sites showed varying degrees of recovery from fires occurring within the last decade.

### Alpine

Treeline in the mountains and highland plateaus on Fort Greely occurs at about 900 m. The southern portions of the base contain small mountains and the foothills of the Alaska range (Fig. 4c). In the southwestern corner of the base, the Molybdenum Ridge group, mostly granitic rock with some sedimentary rock on the northern side, supported a wide variety of alpine habitats. Low birch and dwarf ericaceous scrub dominated large areas. Ridge tops supported *Dryas octopetala*–lichen–dwarf willow communities, and drainages contained tall riparian communities of willow and alder. They supported many species of the genera *Draba*, *Saxifraga*, *Senecio*, and *Minuartia*.

Additionally, the terminus of the Trident Glacier is



**a. Aerial view south down Delta River floodplain on Fort Greely with the Alaska Range mountains in the background.**



**b. Aerial view of birch forest on glacial moraine with kettle ponds. Also visible is a portion of the 1999 Carla Lake burn.**

**Figure 4. Major habitats and divisions of Fort Greely.**



**c. View southeast from alpine area near Molybdomum Ridge toward Alaska Range and Trident Glacier in background.**



**d. Aerial view south over Fort Greely of Donelly Dome (an outlying monadnock of the Alaska Range), which has a number of alpine species on its summit at 1300 m (3910 ft).**

**Figure 4 (cont'd). Major habitats and divisions of Fort Greely.**



**e. Aerial view of lowlands with spruce forest along streams and tussock shrub vegetation on flats between the streams.**



**f. Close-up of Lowland tussock scrub vegetation, which covers about 20% of Fort Greely.**

**Figure 4 (cont'd).**

within the boundaries of the base (Fig. 4c). It is an active glacier, with a thinly vegetated (though distinctive) terminal moraine.

The largest feature of the southeastern corner of the base is Donnelly Dome (Fig. 4d). It is an isolated monadnock of schist, and has well developed alpine communities. Its proximity to the Richardson Highway makes it a heavily used recreation destination, and several trails lead to its summit.

#### *Wet habitats*

Lichvar and Sprecher (1999) delineated the wetlands on Fort Greely. Large expanses of the western half of the base were covered in tussock wetlands, dominated by *Eriophorum vaginatum*, shrubs such as alder, and *Sphagnum* moss (Fig. 4e and f). Also common were low birch, willow, open tall alder, and some sweetgale scrub-shrub wetlands. Numerous kettle ponds exist on the glacial moraines (Fig. 4b). Many of these ponds have a meadow margin of *Carex saxatilis* and *Calamagrostis canadensis*. Well developed *Sphagnum* bogs are rare. Mark Lake (site 34) was one of the few lakes surveyed that supported a diverse aquatic community.

#### *Dry sites*

On Fort Greely, xeric or dry bluffs and slopes were found extensively bordering the major river floodplains (Fig. 4a) and on the south-facing moraines of the Delta and Donnelly glaciation. The largest and most extensive of these dry slopes were within the firing range closures and, therefore, inaccessible. Most dry, south-facing moraine slopes were fairly small and more similar to dry alpine communities than the steppe communities encountered at Fort Wainwright. On Fort Greely, these were dominated by communities of *Calamagrostis purpurascens*, *Potentilla hookeriana*, and *Erigeron cespitosus*, with a high percentage of the cover being *Stereocaulon* lichen, *Arctostaphylos uva-ursi*, and *Saxifraga tricuspidata*. An unusual feature of many of these dry slopes was a shrub-like component of “krumholz” aspen—dwarfed and gnarled trees, less than a meter high—representing approximately 5–20% of the cover.

## METHODS

### **Preliminary checklist development**

A preliminary checklist of vascular plant species expected to be found on Fort Greely was prepared using the range maps in *The Flora of Alaska* (Hulten 1968) and *Alaska Trees and Shrubs* (Viereck and Little 1972) and from a list of specimens from the University of

Alaska Museum-Herbarium (ALA) that were collected in the Big Delta and Mount Hayes Quadrangles between 63°40' N and 64°10' N (Batten 1997). This working list was used to help determine collection sites and focus the survey efforts.

### **Subdivision of base for site selection**

The five ecodistricts recognized by Jorgenson et al. (2001) provided the broadest subdivision of the base and the areas we hoped to visit during the inventory (Fig. 3). These were further divided into 25 ecosubdistricts based on vegetation, soils, permafrost characteristics, water bodies, and fauna. These divisions were used in planning field trips to adequately cover the major landscape and floristic features of the base. Collections were made in as many of these subdivisions as could be accessed, and in as many vegetation types and specialized habitats within those ecosubdistricts as was logistically possible. Specific survey sites were identified using color infrared aerial photography (1:60,000), topographic maps, and consultation with biologists conducting the Land Condition Trend Analysis (LCTA) project.

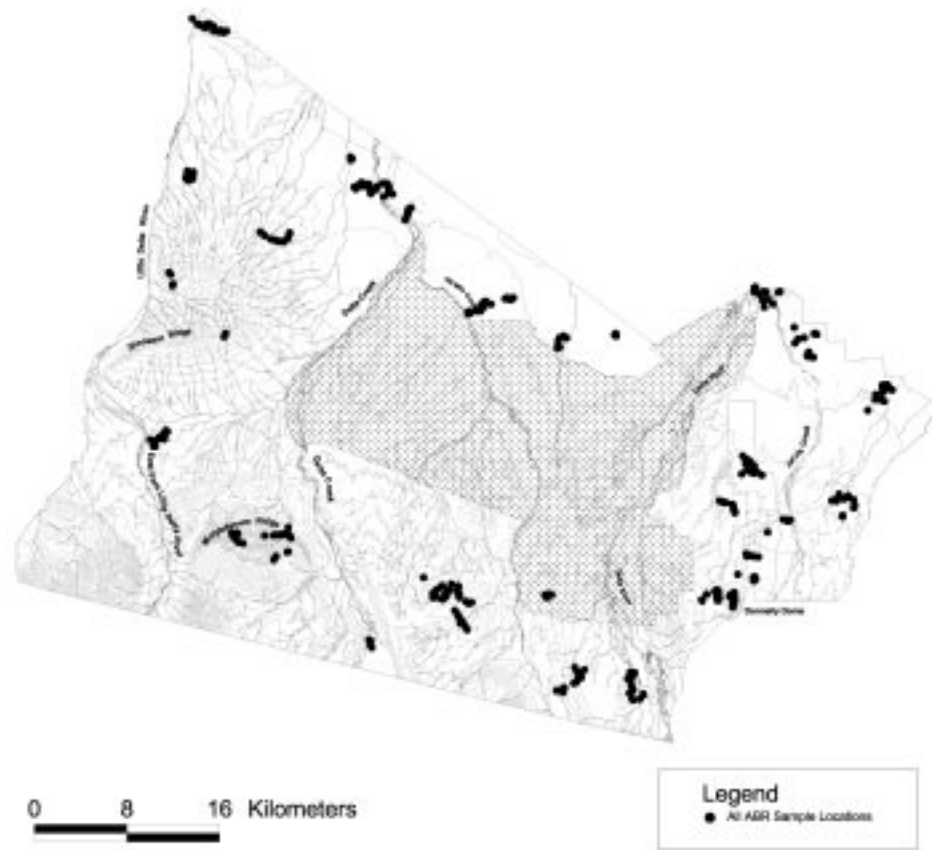
### **Site access and collecting**

Preliminary collections were begun by ABR, Inc., in 1996 (Jorgenson et al. 2001) along several transects sampled for vegetation and soils. In 1998 ABR sampled vegetation along additional transects on 74 sample plots and, in addition, added 89 ground-reference plots at sites not represented along these transects. In August 1998 they also visited 126 map verification plots to assist in construction of a vegetation map. Figure 5 shows the location of all of these sites from 1996 to 1998. Although plant collections and floristic inventories were not conducted at all of these sites, they provide a record of site visits by botanists.

Inventories were continued during the middle of August 1997 by R. Lichvar while he was delineating wetlands on Fort Greely. Finally, the bulk of the collection was made during the first two weeks of July and all of August 1998 by M. Duffy. All sites where collections were made are shown in Figure 6 and a list of the site names and numbers corresponding with this map are provided in Table 1.

Special attention was given to obtaining as broad a representation of survey sites as possible within two distinct limitations: four-fifths of the base is separated from the road system by the Delta River, and approximately one-quarter of the base is off-limits owing to its use as artillery and bombing ranges (Fig. 5 and 6). In addition, the cantonment area on Fort Greely (Fig. 2) was specifically excluded from the floristic inventory, unlike the inventories on Forts Richardson and Wainwright.





**Figure 5. Sites where ABR, Inc., conducted an ecological land survey in 1996 and 1998 on Fort Greely (Jorgenson et al. 2001). Shaded areas are impact ranges.**

The portion of Fort Greely east of the Delta River is bisected by the Richardson Highway, and has numerous roads and dirt tracks that allowed for access by four-wheel drive and all-terrain vehicles, even to remote areas, where inventories could be carried out on foot. The greater portion of the base, west of the Delta River, was accessed using helicopter support. A remote camp was set up on Molybdenum Ridge for several days of collecting in early August 1998. Numerous brief surveys were conducted during trips shared with biologists working on other projects in late August 1998.

Inventory sites where collections were made were assigned a number and plotted as a point onto the two Defense Mapping Agency 1:50,000-scale topographic maps. In addition a hand-held GPS unit was used to record coordinates and navigate to sites. The plotted locations or GPS coordinates were digitized and imported into Arcview GIS to produce maps showing inventory sites (Fig. 5 and 6, Table 1).

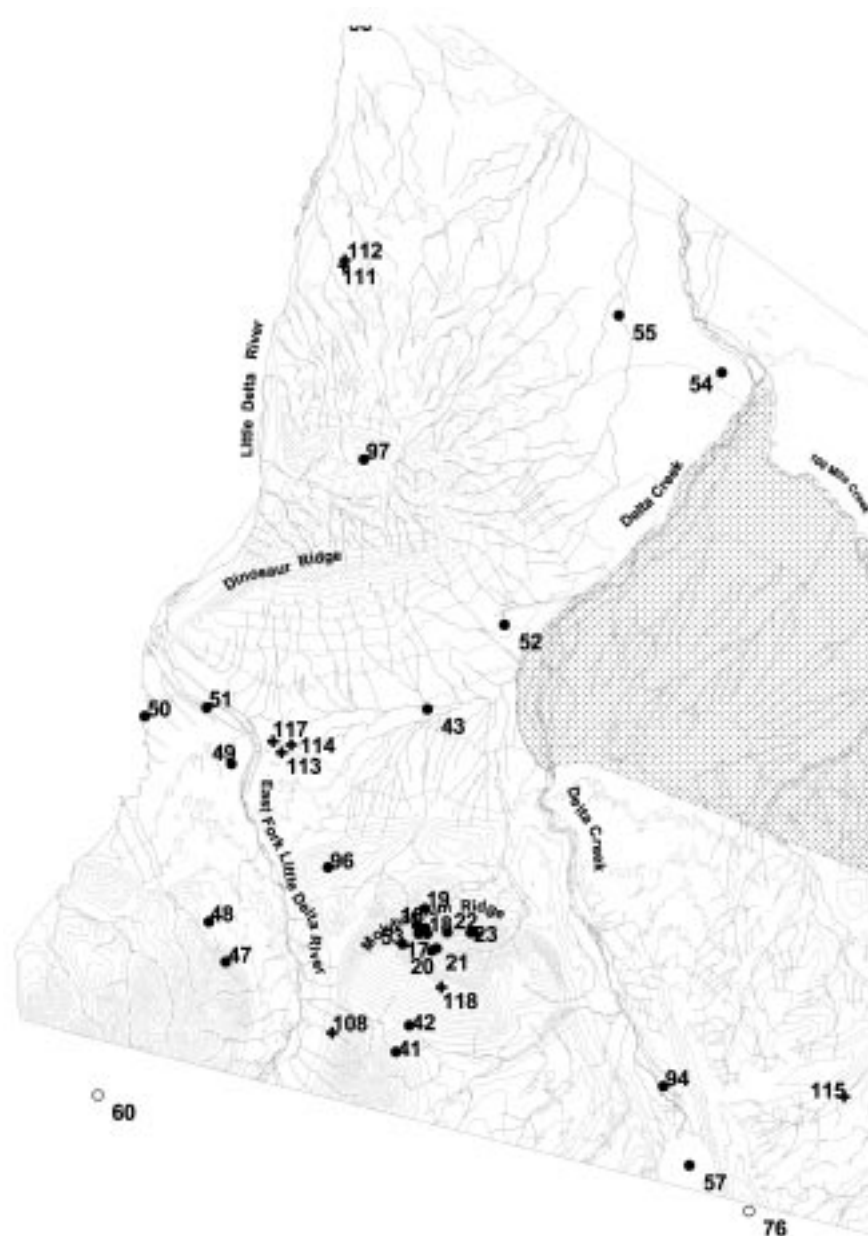
#### **Identification and verification of specimens**

Collections were tentatively identified in the field using Hulten (1968). Specimens collected in 1997, and

some of the material collected by ABR, were reviewed by M. Raynolds in September 1997. Specimens collected during 1998, and additional ABR material, were reviewed by M. Duffy in 1998 and 1999 using Hulten (1968), Cody (1996), and other references, as well as collections archived at ALA and the Gray Herbaria at Harvard University in Cambridge, Massachusetts. Rare and difficult taxa were verified by C. Parker at ALA in March 1999. Other monographs and flora publications consulted include Hitchcock et al. (1955–1969), Porsild (1974), Welsh (1974), Brayshaw (1985), Aiken and Darlyshire (1990), Williams and Lipkin (1991), U.S. Soil Conservation Service (1994), and Aiken et al. (1996).

#### **Botanical nomenclature**

As with the inventories of Forts Richardson and Wainwright, nomenclature for this report follows The University of Alaska Museum Plants database (ALABASE), which is based on the most recent taxonomic revisions of the Alaska flora (Murray et al. 1994) and the Flora of North America project (FNAEC 1993). Some plant names, therefore, differ from those used in Hulten (1968) and his supplement (Hulten 1973). In

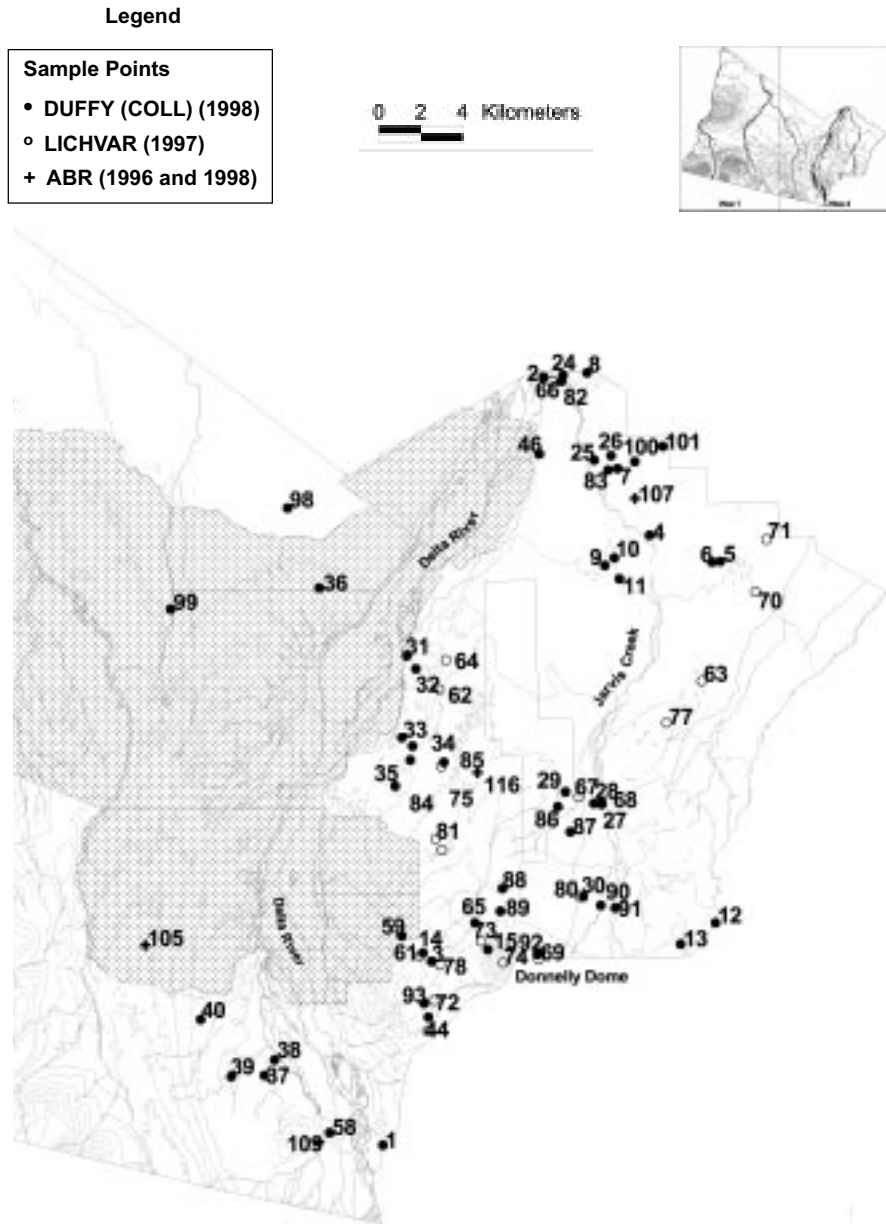


a. Western side of Fort Greely.

**Figure 6. Locations of floristic inventory sites where ABR, Inc., M. Duffy, and R. Lichvar collected vascular plants or inventoried vascular plant species, or both. (Site numbers are described in Table 1.)**

these cases the name given in Hulten follows in brackets in Appendices A and B. In some cases there are no clear matches to the treatments given in Hulten (for example, the genus *Elymus*), and in one case a species was not found in Hulten because it has only recently been known to be in the area (*Potamogeton*

*obtusifolius*). A more up-to-date source, Cody's *Flora of the Yukon Territory* (1996) is very useful for the Fort Greely area. Two other sources can be used to determine current synonyms: Kartesz (1994) and the NRCS Plants database, which is available over the Internet at <http://plants.usda.gov>.



b. Eastern side of Fort Greely.

Figure 6 (cont'd).

## RESULTS

### Inventory sites

Collections were made at 22 sites in 1997 by R. Lichvar and at 59 sites in 1998 by M. Duffy. An additional 20 sites were surveyed by Duffy in 1998 where no collections were made, for a total of 101

sites (Table 1). Collections from 16 ABR transects were also used for the species list. All site locations are shown on the maps in Figure 6, with sites noted as numbered points described in Table 1. Two sites fell just outside the boundaries of Fort Greely, but species collected at those sites were all observed within base boundaries.

**Table 1. Floristic inventory observation and collection sites located on Figure 6 maps.**

<i>Site /map number</i>	<i>Site name</i>
<b>M. Duffy collection sites August 1998</b>	
1	Delta River gravel bar, east side
2	Jarvis Creek–Delta River confluence
3	Donnelly radio tower 1
4	Jarvis Creek, between Buffalo and Eddy DZ
5	33-Mile Loop Road east of Eddy DZ 1
6	33-Mile Loop Road east of Eddy DZ 2
7	Buffalo DZ, center
8	33-Mile Loop Road at the radio tower
9	Canister Lake
10	ridge east of Canister Lake
11	wet meadow southeast of Canister Lake
12	Granite Creek
13	Granite Lakes
14	Donnelly radio tower 2
15	Donnelly Dome, west side
16	Molybdenum Ridge 1
17	Molybdenum Ridge 2
18	Molybdenum Ridge 3
19	Molybdenum Ridge 4
20	Molybdenum Ridge 5
21	Molybdenum Ridge 6
22	Molybdenum Ridge 7
23	Molybdenum Ridge 8
24	dunes northeast of Jarvis Creek bridge
25	Bear Crossing
26	Buffalo DZ north
27	12-Mile Crossing
28	muskeg west of 12-Mile Crossing
29	ridge west of 12-Mile Crossing
30	road southeast of old radar domes
31	bluffs at OP6
32	pond near OP6
33	bluffs at OP7A
34	Mark Lake
35	meadow east of Twin Lakes
36	Nevada Lakes
37	Minnesota Training Area 1
38	Delta River gravel bar, west side 1
39	Minnesota Training Area 2
40	Minnesota Training Area 3
41	saddle on north flank of Patton Mt.
42	saddle between Patton Mt. and Molybdenum Ridge
43	wet meadow south of Deadhorse Creek
44	Weasel Lake
45	Dome Road
46	Richardson Highway rest stop
47	ridge north of MacArthur Mt.
48	Dice Lakes
49	pond 1 km northeast of Claudell Lake
50	Buchanan Creek
51	East Fork of the Little Delta River
52	Hillbilly Lake
53	Molybdenum Ridge 9
54	muskeg 1 km west of Delta Creek
55	woods 3 km west of Delta creek
56	Little Delta River

**Table 1 (cont'd).**

<i>Site /map number</i>	<i>Site name</i>
57	Trident Glacier
58	Delta River gravel bar, west side 2
59	Donnelly radio tower 3
<b>R. Lichvar collection sites 1997</b>	
60	3 miles southwest of the peak of MacArthur Mountain
61	approx. 2 miles west of Donnelly Dome
62	Bolio Lake
63	Guitar Lake area
64	inlet side of Bolio Lake near road crossing
65	J Lake
66	Jarvis Creek bridge
67	Jarvis Creek floodplain, north or 12-Mile Crossing
68	Jarvis Creek, 12-Mile Crossing
69	Jarvis Lake Road
70	just north of Dall Lake
71	Mary Lake
72	north of Weasel Lake
73	north side of Donnelly Dome
74	northeast side of Donnelly Dome
75	North and South Twin Lakes
76	Ridge east of Trident Glacier
77	southwest of String Lake
78	trail side northeast of Weasel Lake
79	Weasel Lake area
80	West of Ober Creek
81	Wishbone Lake area
<b>Observation Sites visited in 1998 by M. Duffy, but where no collections were made</b>	
82	Jarvis Creek, southeast of bridge
83	aspen forest west of Buffalo DZ
84	Big Lake
85	Twin Lakes
86	lichen forest north of Fox DZ
87	forest east of Donnelly Assault Airfield
88	pond west of Dome Road
89	wet meadow south of Dome Road
90	Ober Creek, east of old radar domes
91	Jarvis Creek, east of old radar domes
92	small pond south of Bear DZ
93	radio tower north of Weasel Lake
94	Delta Creek, north of Trident Glacier
95	Molybdenum Ridge 10
96	ridge north of York Saddle
97	ridge north of Dinosaur Ridge
98	meadow 1 km south of Diamond Lake
99	burned meadow, east end of Kansas Lakes Impact Area
100	Buffalo DZ east
101	road east of Buffalo DZ
<b>ABR, Inc., collection sites 1996 and 1998</b>	
102	ridge at northern tip of reservation (G10.10a)

**Table 1 (cont'd).**

Site /map number	Site name
103	bluff; ridge at northern tip of reservation (G10.21)
104	lower Little Delta River; abandoned floodplain (G10.22)
105	lateral moraine east of Duluth Lake (G16.01)
106	Bear Lake moraine (G18.02)
107	approximately 2 km southeast Buffalo DZ (G23.01)
108	Richardson Highway northeast of Donnelly Dome (G41 road)
109	southern end Buffalo Hill (G43.17)
110	central-northern ridge line Molybdenum Ridge (G5.01)
111	southwest of 4-Square Lakes 1 (transect 1) (P1.04A)
112	southwest of 4-Square Lakes 2 (transect 1) (P1.07)
113	moraine at Gnat Lake (transect 2) (P2.03)
114	lake edge; moraine at Gnat Lake (transect 2) (P2.09)
115	beaver-dammed creek bottom west of Serpent Lake (transect 3) (P3.06)
116	moraine east of Big Lake (pond) (transect 6) (P6.09)
117	pond edge moraine at Gnat Lake (BJ2.2)
118	south side Molybdenum Ridge

### Vascular plant collections

A total of 723 collections were made during 1997 and 1998: 164 in 1997 and 559 in 1998. On the base, 497 taxa of vascular plants, representing 64 families and 198 genera, were documented. A species list for the Fort Greely survey was compiled and is presented in Appendices A (listed alphabetically) and B (listed by family). The 497 species and subspecies documented during this survey represent approximately 26% of the 1960 taxa listed in Hulten (1968).

### Collections at ALA

The list of species represented by collections in the University of Alaska Museum-Hebarium (ALA) from the Mt. Hayes and Big Delta 1:250,000 USGS quadrangles was consulted. Six taxa from this list were collected on Fort Greely by Holmes and Benninghoff (1957) but were not found during this inventory (*Woodsia glabella*, *Eritrichium splendens*, *Polemonium pulcherrimum*, *Pyrola grandiflora*, *Salix barclayi*, and

*Sparganium hyperboreum*). These six species are included in the species list in Appendices A and B. In addition, 59 taxa were represented on the original Herbarium list but not collected on Fort Greely (App. C). These were also not collected during this inventory, but they may be present on the base.

## DISCUSSION

### Distribution of inventory sites

Although it was not possible to collect in the large central impact areas of Fort Greely, fairly good coverage of the major regions and habitats was obtained. Of the inventoried sites, 36 were west of the Delta River, and 65 were on the eastern side (Fig. 6). All five of the major ecodistricts mapped by Jorgenson et al. (2000) for Fort Greely were visited (Fig. 3). Although collection sites were well distributed geographically, no collections were made during June and some early flowering species may have been missed.

### Rare vascular plant species records

None of the plants found during the survey are currently listed by the U.S. Fish and Wildlife Service as endangered or threatened, and none are currently on the list of critically rare plants (G1 and G2 status) developed by the Alaska Rare Plant Working Group (Lipkin and Murray 1997). However, 22 taxa are considered somewhat rare and are being tracked by the Alaska Natural Heritage Program's Biological and Conservation Database (BCD) (Table 2). The endemic *Synthyris borealis* Pennell (kittentails), found at all high alpine sites on Fort Greely, was formerly tracked in the BCD but is no longer on the Heritage Program list. The others are listed in Table 2 and are briefly described below with Heritage Program global (G) and state (S) ranks given for each tracked taxon. These ranks are based on a scale from 1 (critically imperiled because of extreme rarity) to 5 (demonstrably secure) with 2 (imperiled), 3 (rare or uncommon), and 4 (apparently secure). The ranks are further modified to denote subspecies or varieties (T) and uncertainty about taxonomic status (Q) (AKNHP 1998). All those described have state abundance levels of S3, S2, or S1 or a combination of two of these. Many of these tracked taxa are within their ranges and were not unexpected finds, but several are very significant additions to the body of knowledge about the Interior Alaska flora, and in some cases, the flora of Alaska. In the list below, the site number is given (Fig. 6, Table 1) where a species was found only once or twice. Where a species was found repeatedly, no site numbers are given.

1. *Artemisia laciniata* Willd. (cut-leaf sagewort) G5

**Table 2. Species on Alaska Natural Heritage Program Biological Conservation Database found on Fort Greely, with ranking.**

Scientific name	Global rank*	State rank†
<i>Artemisia laciniata</i> Willd.	G5	S2
<i>Carex atratiformis</i> Britton ssp. <i>raymondii</i> (Calder) A. Pors.	G5T5	S2
<i>Carex crawfordii</i> Fern.	G5	S2S3**
<i>Carex deweyana</i> Schwein.	G5	S1SE††
<i>Carex eburnea</i> Boott	G5	S2S3
<i>Carex sychnocephala</i> Carey	G4	S1
<i>Cryptogramma stelleri</i> (Gmel.) Prantl	G5	S2S3
<i>Cystopteris montana</i> (Lam.) Bernh. ex Desv	G5	S3
<i>Dodecatheon pulchellum</i> (Raf.) Merr. ssp. <i>pauciflorum</i> (Greene) Hulten	G5T5Q	S2
<i>Draba incerta</i> Payson	G5	S2S3
<i>Draba stenopetala</i> Trautv.	G3	S3
<i>Festuca brevissima</i> Yurtsev	G3	S3
<i>Glyceria pulchella</i> (Nash) K. Schum.	G5	S2S3
<i>Phlox hoodii</i> Richards.	G5	S1S2
<i>Phlox sibirica</i> L. ssp. <i>richardsonii</i> (Hook.) Hulten	G4T2T3Q	S2
<i>Potamogeton obtusifolius</i> Mertens and Koch	G5	S1
<i>Salix setchelliana</i> Ball	G3G4	S3
<i>Saxifraga adscendens</i> L. ssp. <i>oregonensis</i> (Raf.) Bacig.	G5T4T5	S2S3
<i>Sisyrinchium montanum</i> Greene	G5	S1
<i>Stellaria alaskana</i> Hulten	G3	S3
<i>Viola selkirkii</i> Pursh ex Goldie	G5?	S3

\*G3, very rare and local; G4, apparently secure globally; G5, secure globally; T = global rank of subspecies or variety; Q = uncertain taxonomy.

†S1, critically imperiled in state; S2 imperiled in state; S3, rare or uncommon in state; SE, possibly introduced.

\*\*Two different ranks in global or state (S2S3) indicates that rank is intermediate between the two.

†† Possibly introduced to state.

S2: An Asian species with a very restricted range in North America, found on dry bluffs and open woods. It was found at Mark Lake (site 34).

2. *Carex atratiformis* Britton ssp. *raymondii* (Calder) A. Pors. (Raymond's sedge) G5T5 S2: A robust sedge of moist open areas. It was found at several sites in the Jarvis Creek Lowlands.

3. *Carex crawfordii* Fern. (Crawford's sedge) G5 S2S3: A sedge of dry sites and roadsides. It is proving to be more common than previously known and was observed at several sites in the Jarvis Creek Lowlands.

4. *Carex deweyana* Schwein. (Dewey sedge) G5 S1SE: Known from only a few sites in the state. A small, weak specimen with few perigynia was collected from a disturbed roadside at site 5. This sedge is suspected of being introduced to Alaska (SE); the habitat of this specimen would support this possibility.

5. *Carex eburnea* Boott (bristleleaf sedge) G5 S2S3: A small sedge characteristic of sandy gravel bar margins. It was found at several sites along the Delta River and Jarvis Creek.

6. *Carex sychnocephala* Carey (many headed sedge)

G4 S1: A very distinctive sedge, rarely seen in the state. Small, robust plants were found growing with other sedges and rushes along the wet meadow margin along the south end of Mark Lake (site 34).

7. *Cryptogramma stelleri* (Gmel.) Prantl (fragile rockbrake) G5 S2S3: A species of parsley fern. It was found at site 4, where several clumps were growing on the moist fine sand of an old embankment, in the shade of tall alder scrub.

8. *Cystopteris montana* (Lam.) Bernh. ex Desv (mountain bladder fern) G5 S3: A calciphile. It was collected at site 1, growing in fine moist sand in the shade of thick tall alder scrub, on a southwest facing slope above the river bar. It was also observed in the thick feathermoss of a white spruce forest at site 30.

9. *Dodecatheon pulchellum* (Raf.) Merr. ssp. *pauciflorum* (Greene) Hulten (few-flowered shooting star) G5T5Q S2: A robust shooting star of dry interior sites. It was found at site 59, a south-west facing slope.

10. *Draba incerta* (Yellowstone whitlowgrass) Payson G5 S2S3: A small mustard. It was found on rock outcrops and gravelly breaks in the tundra along

the northern flanks of Donnelly Dome (site 15).

11. *Draba stenopetala* Trautv. (thin petal whitlowgrass) G3 S3: A tightly compact whitlowgrass. Described as “rare and remarkable” by Hulten (1968), it is now known to be not quite so rare, but it is uncommon and still remarkable. It was found on a high ridge crest on Molybdenum Ridge (site 22).

12. *Festuca brevissima* Yurtsev G3 S3: A small alpine fescue, described by Hulten (1968) under the name *Festuca ovina* L. ssp. *alaskensis* Holmen. It was found at Donnelly Dome (site 15) and Molybdenum Ridge (site 53).

13. *Glyceria pulchella* (Nash) K. Schum. G5 S2S3: A small manna grass. It was found at site 11, southeast of Canister Lake.

14. *Phlox hoodii* Richards. (spiny phlox) G5 S1S2: A dwarf phlox known mostly from further north in Alaska and from central Yukon Territory. It was found by ABR biologists growing on a steep, south-facing bluff on Buffalo Hill (site 109), in a sagebrush–grass community.

15. *Phlox sibirica* L. ssp. *richardsonii* (Hook.) Hulten (Richardson’s phlox) G4T2T3Q S2: A dwarf phlox, now known from several sites in the Alaska Range, but still quite rare. It was found growing in gravelly open soil and among rock outcrops along the ridge crest at the north end of Donnelly Dome (site 15), and is not very common there.

16. *Potamogeton obtusifolius* Mertens and Koch G5 S1: A distinctive but probably much overlooked pondweed. It was not recorded in Hulten (1968) and only one record was shown in Cody (1996). There are only two other Alaska records (both recent) for this plant at ALA: one from Palmer and one from Fort Yukon. It was found in shallow water at Mark Lake (site 34).

17. *Salix setchelliana* Ball (Setchell willow) G3G4 S3: A small, distinctive endemic. It was found on most of the gravel bar sites of the Delta River and at the mouth of Jarvis Creek.

18. *Saxifraga adscendens* L. ssp. *oregonensis* (Raf.) Bacig. G5T4T5 S2S3: A small, uncommon alpine species. Several plants without flowering stalks were found on the terminus of the Trident Glacier (site 57).

19. *Sisyrinchium montanum* Greene (mountain blue-eyed grass) G5 SP: A small, densely tufted blue-eyed grass. Apparently, it is new to Alaska, except for an unpublished collection from the southeastern portion of the state.\* The nearest record in Hulten (1968) is approximately 400 km away in the Yukon Territory, and

the specimen at ALA is from Dall Island, at the southern end of southeast Alaska. It was found in the moist, gravelly soil of the northeast corner of Buffalo Drop Zone (site 26), an abandoned creek bed now kept clear of brush and used for training maneuvers. Several dozen clumps of plants were observed. Also reported from site 101, east of Buffalo Drop Zone, by the LCTA crew.

20. *Stellaria alaskana* Hulten (Alaska starwort) G3 S3: A distinctive, large-flowered starwort, endemic to the region. It was found on gravelly screes, at many sites on Molybdenum Ridge.

21. *Viola selkirkii* Pursh ex Goldie (Selkirk violet) G5? S3: A small and easily overlooked violet. It was found at the same site and general habitat as *Cryptogramma stelleri*; it is known from a few widely spaced locations within Alaska.

22. While not especially rare, specimens of *Primula eximia* collected on Molybdenum Ridge were notable for their large size—some scapes were approximately 40 cm tall.

With the exception of *Draba stenopetala*, *Festuca brevissima*, *Salix setchelliana*, and *Stellaria alaskana*, which are endemic to the region, these taxa are peripheral species, with larger populations centered further south in North America, or west in Asia. Some of them barely reach Alaska, and are known from only a few sites in the state or nearby Canada (State Rank 1 or 2).

### Vascular plant range extensions

A number of plants found during this survey are significant range extensions. Besides the tracked species *Carex deweyana*, *Carex sychnocephala*, *Draba incerta*, *Festuca brevissima*, *Potamogeton obtusifolius*, *Phlox hoodii*, *Phlox sibirica* ssp. *richardsonii*, *Sisyrinchium montanum*, and *Viola selkirkii* described above, several other more common plants were found more than 100 km (60 miles) beyond the ranges given in Hulten (1968):

1. *Artemisia globularia* Cham. ex Bess. (purple wormwood): A Beringian plant found mostly in the western part of the state. One other recent record exists for the Mount Hayes area. It was found at sites 17 and 53 on Molybdenum Ridge.

2. *Calypso bulbosa* (L.) Oakes (fairy slipper): A briefly flowering orchid known from farther south and farther north in the Fairbanks area. It is currently known from a number of new locations. It was found in a thick white spruce forest that had little understory growth (site 8).

3. *Cypripedium guttatum* Sw. var. *guttatum* Sw. (spotted lady’s slipper): A large lady slipper with a range similar to *calypso*. This orchid, also known from many new sites, was fairly commonly on dry slopes at sites 13 and 29.

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\*Personal communication with A. Batten, A. Cholewa, and C. Parker, ALA, University of Alaska, Fairbanks, 1998.

4. *Draba lonchocarpa* Rydb. var. *lonchocarpa*: This species of whitlowgrass is known more typically from locations south of the Alaska Range. It was found on rocky outcrops at Donnelly Dome.

5. *Eriophorum russeolum* Fries ex Hartman (rusty cottongrass): Though Hulten records a limited interior distribution for this species, it is known from an increasing number of sites. It was also found during the Fort Wainwright inventory (Racine et al. 1997). It was collected by ABR biologists at site 117 near Gnat Lake, and also observed along the trail leading to site 12 (Granite Creek area).

6. *Galium brandegei* Gray: A small and easily overlooked bedstraw. It was found at the gravelly margin of Mark Lake (site 34). Its nearest location in Hulten (1968) is Fairbanks, and it was found at Fort Wainwright in the Yukon Maneuver Area (Racine et al. 1997).

7. *Poa secunda* J. Presl *sensu* Cody 1996: Includes *P. nevadensis* Vasey, *P. ampla* Merrill, *P. stenantha*, in part, *P. scabrella* (Thurb.) Benth. and *P. canbyi* (Scribn.) Howell, most of which have restricted ranges in Alaska. A group in need of more work in Alaska, it was found in a young white spruce forest, near where it opened into tall willow scrub, at site 8.

8. *Potentilla virgulata* A. Nels.: A cinquefoil that was also found during the Fort Wainwright survey. This collection represents another record that reduces the gap between its northern and southern Alaskan ranges.

9. *Polygonum pennsylvanicum* L. ssp. *oneillii* (Brenckle) Hulten: A small smartweed. It was mostly known from south of the Alaska Range and the Fairbanks area, and was found consistently in the muddy margin of ponds and lakes.

10. *Primula cf. egalikensis* Wormsk. ex Hornem. (Greenland primrose): Small rosettes of non-farinose leaves, without flower stalks. It was found in wet sand on silty stream banks at sites 38 and 58 on the Delta River and appears to fit the description of this small primrose. If so, it represent a sizable range extension.

11. *Salix rotundifolia* Trautv. ssp. *dodgeana* (Rydb.) Argus: Although Hulten (1968) shows only two stations in the Northwest Territories for what he called *Salix dodgeana* Rydb., Argus (1973) recognizes it as a subspecies of *Salix rotundifolia* and notes that it occurs sporadically throughout the range of ssp. *rotundifolia*. It was found in sandy scree on Molybdenum Ridge.

12. In addition, the alien species *Achillea millefolium* (*sensu* Hulten), *Avena sativa*, *Gnaphalium uliginosum*, *Rumex longifolius*, *Rumex maritimus* ssp. *fueginus*, and *Rumex maritimus* ssp. *maritimus* were large range extensions.

## Comparisons with other areas

The number of vascular plant species documented here for Fort Greely (497) is very similar to the 491 species described for Fort Wainwright (Racine et al. 1997). However, only about 65% of the species (~325) on Fort Greely also occur on Fort Wainwright. The remaining 35% of the species (~170) found on Fort Greely do not occur on Fort Wainwright (marked with asterisk in Appendix A). At least two elements of the Fort Greely flora account for these differences:

- *Strictly alpine species found in the mountain sites of the Alaska Range on Fort Greely.* The southern portion of Fort Greely encompasses mountains of the Alaska Range (mainly Donnelly Dome and Molybdenum Ridge), some of which reach elevations of 1800 m (nearly 6000 ft). These mountains support a wide variety of alpine communities that are missing from the treeless alpine hilltops of the Yukon Maneuver Area at Fort Wainwright, whose highest elevations are under 1000 m (3300 ft). On Fort Wainwright there are no scree slopes and fell fields, steep rock outcrops and snowmelt communities, common at Fort Greely alpine sites. A large number of species are typical of Fort Greely alpine sites, but absent from Fort Wainwright, and include *Silene acaulis*, *Thalictrum alpinum*, *Primula eximia*, *Draba* sp., *Asragalus* sp., *Dryas* sp., *Papaver* sp., *Saxifraga* sp. (10 species), and *Lloydia serotina*.
- *Floodplain species that occur on the well-developed floodplains of the Delta River, Delta Creek, and Little Delta River.* Only a small portion of the Tanana River floodplain occurs on Fort Wainwright. Species in this group include *Minuartia dawsonensis*, *Salix setchelliana*, and *S. polaris*.

About 150 species occur on Fort Wainwright but not on Fort Greely. These include several elements from habitats common on Fort Wainwright but absent on Fort Greely:

- *Aquatic and wetland habitats.* These habitats are well developed in the Tanana Flats and Chena River Lowlands on Fort Wainwright. Here, extensive rich fens and bogs occur as a result of groundwater discharge and thermokarst (Racine and Walters 1994). Species in this group belong to emergent and aquatic families such as the *Alismataceae*, *Typhaceae*, *Urticaceae*, *Lemnaceae*, *Araceae*, and *Balsaminaceae*. Species include *Alisma trivale*, *Lysmachia thyrsiflora*, *Juncus stygius*, *Sium suave*, *Bidens cernua*, *Urtica dioica*, *Carex leptalea*, and *Carex lasiocarpa*, all found at Fort Wainwright, but not found at Fort Greely.
- *Disturbed and modified habitats.* Many genera and



species of alien plants were also missing from the flora on Fort Greely in part because of the exclusion of the cantonment area on Fort Greely from the study, which, for example, excluded the observed species *Crepis tectorum* and *Potentilla gracilis*. However, casual observation of the Greely cantonment revealed far fewer alien species than were found at either Fort Richardson or Fort Wainwright.

- *Xeric-steppe habitats*. Although there are dry, south-facing slopes on Fort Greely, these are much younger because of glaciation than the very old unglaciated dry slopes and bluffs, such as the Wood River Buttes on Fort Wainwright. Therefore, only a few sites at Fort Greely contained steppe-like elements such as *Artemisia laciniata*. Steppe species on Fort Wainwright not found on Fort Greely include *Rosa woodsii*.

## CONCLUSIONS

The floristic inventory of Fort Greely produced a fairly comprehensive species list, typical for interior Alaska, but which also includes a significant number of alpine and floodplain species not found on Fort Wainwright. While the flora of the two bases together contains over 650 species and represent a significant proportion of the species of interior Alaska, there are important floristic differences between the two bases, reflecting strong environmental and landscape differences related to geological history, location relative to the Alaska Range, elevation, and permafrost.

Species found on Fort Greely with the largest range extensions include *Sisyrinchium montanum*, found at Buffalo Drop Zone and known from only one other site in Alaska, and *Potamogeton obtusifolius*, an aquatic species collected from Mark Lake, which is known from only two other locations in the state. Of the other plants collected during this survey, 20 are regarded as rare and tracked by the Alaska Natural Heritage Program.

In addition there are several significant habitats that are species-rich or unique where many of the rare plants were found. Molybdenum Ridge, Donnelly Dome, Buffalo Drop Zone, and Mark Lake account for most of the rare species occurrences. Other habitats that deserve special attention are xeric slopes containing low shrub and grassland communities, such as *Artemisia frigida* and *Calamagrostis purpurascens*, and high alpine ridges containing *Dryas*-dwarf *Salix* communities, scree slopes, and fell fields. Sites not well understood, which merit closer attention, include the dry morainal slopes where "krumholz" aspen communities occur, large bluffs of the west side of the Delta River (located within the impact area), and the Hayes Highland plateaus.

In terms of protection for Alaska's plant species biodiversity, we did not find any species on Fort Greely with Global G1 (critically imperiled globally) or G2 (imperiled globally) status in the Biological Conservation Database of the Alaska Natural Heritage Program. However, there are about 16 species with State S1 (critically imperiled in state) or S2 (imperiled in state) status. Land managers should be concerned about their conservation because land use on military installations is basically unrestricted (Duffy et al. 1999). Both the Buffalo Drop Zone and Mark Lake sites are heavily used for either training maneuvers or recreation, and though neither of the rare species at these sites appears to be adversely impacted, land managers should be aware of their significance.

## LITERATURE CITED

- Aiken, S.G., and S.J. Darbyshire** (1990) Fescue grasses of Canada. Agriculture Canada Research Branch, publication 1844/E.
- Aiken, S.G., M.J. Dallwitz, C.L. McJannet, and L.L. Consaul** (1996) Festuca of North America: Descriptions, illustrations, identification, and information retrieval (<http://biodiversity.uno.edu/delta/>), 2 April 1998.
- Alaska Natural Heritage Program** (1998) AKNHP vascular plant tracking list. ([http://www.uaa.alaska.edu/enri/aknhp\\_web/index.html](http://www.uaa.alaska.edu/enri/aknhp_web/index.html)), February 1998.
- Argus, G.** (1973) The genus *Salix* in Alaska and the Yukon. *Publications in Botany*, No. 2, National Museums of Canada, Ottawa, Ontario.
- Brayshaw, T.C.** (1985) Pondweeds and bur-reeds and their relatives: Aquatic families of monocotyledons in British Columbia. Occasional Paper No. 26 of the British Columbia Provincial Museum, Victoria, British Columbia, Canada.
- Batten, A.R.** (1997) Taxa documented by specimens for Mt. Hayes and Big Delta Quads. Northern Plant Documentation Center, Miscellaneous Report. Herbarium, University of Alaska Museum, Fairbanks, Alaska.
- Benson, C.S.** (1972) Physical properties of the snow cover in the Fort Greely area, Alaska. U.S. Army Cold Regions Research and Engineering Laboratory, Special Report 178.
- Church, R.E., T.L. Péwé, and M.J. Andresen** (1965) Origin and environmental significance of large-scale patterned ground, Donnelly Dome area, Alaska. U.S. Army Cold Regions Research and Engineering Laboratory, Research Report 159.
- Cody, W.J.** (1996) *Flora of the Yukon Territory*. Ottawa, Ontario: NRC Research Press.
- Duffy, D.C., K. Boggs, R.H. Hagenstein, R. Lipkin, and J.A. Michaelson** (1999) Landscape assessment of

the degree of protection of Alaska's biodiversity. *Conservation Biology*, **13**: 1332–1345.

**Flora of North America Editorial Committee** (1993) *Flora of North America North of Mexico*. New York: Oxford University Press.

**Hitchcock, C.L., A. Cronquist, M. Owenby, and J.W. Thompson** (1955–1969) *Vascular Plants of the Pacific Northwest*, Parts 1–5. Seattle: University of Washington Press.

**Holmes, G.W. and W.S. Benninghoff** (1957) Terrain study of the army test area, Fort Greely, Alaska. U.S. Geological Survey Military Geology Branch Washington, D.C.

**Hulten, E.** (1968) *Flora of Alaska and Neighboring Territories*. Stanford, California: Stanford University Press.

**Hulten, E.** (1973) Supplement to the *Flora of Alaska and Neighboring Territories*. A study in the flora of Alaska and the Transberingian connection. *Botaniska Notiser*, **126**: 459–512.

**Jorgenson, M.T., J. E. Roth, M.D. Smith, S.F. Schlentner, W. Lentz, E.R. Pullman, and C.H. Racine** (2001) An ecological land survey for Fort Greely, Alaska. U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Technical Report TR-01-4.

**Kartesz, J.T.** (1994) *A synonymized checklist of the Vascular Flora of the United States, Canada and Greenland*. Oregon: Timber Press.

**Lichvar, R., C. Racine, B. Murray, G. Tande, R. Lipkin, and M. Duffy** (1997) A floristic inventory of vascular and cryptogam plant species at Fort Richardson, Alaska. U.S. Army Waterways Experiment Station, Environmental Laboratory, Technical Report EL-97-4.

**Lichvar, R., and S. Sprecher** (1999) Wetland delineation for Fort Greely, Ak. Final Report to U.S. Army Alaska, Fort Richardson, Alaska.

**Lipkin, R., and D.F. Murray** (1997) Alaska rare plant field guide. U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management,

Alaska Natural Heritage Program, and U.S. Forest Service.

**Murray, D.M., C. Parker, and A.R. Batten** (1994) Flora of Alaska (preliminary). Northern Plant Documentation Center Report 86. Herbarium, University of Alaska Museum, Fairbanks, Alaska.

**Nelson, G.L.** (1995) Overview of environmental and hydrogeologic conditions near Big Delta, Alaska. U.S. Geological Survey Open-File Report 95-180.

**Péwé, T.L., and R.D. Reger** (1983) Guidebook to permafrost and quaternary geology along the Richardson and Glenn Highways between Fairbanks and Anchorage, Alaska. Guidebook 1. In *Fourth International Conference on Permafrost, 18–22 July, Fairbanks, Alaska*. Alaska Division of Geology and Geophysical Surveys, Anchorage, Alaska.

**Porsild A.E.** (1974) Materials for a flora of central Yukon Territory. *Publications in Botany*, No. 4, National Museums of Canada, Ottawa, Ontario.

**Racine, C.H., and J.C. Walters** (1994) Groundwater-discharge wetlands in the Tanana Flats, interior Alaska, USA. *Arctic and Alpine Research*, **26**: 418–426.

**Racine, C., R. Lichvar, B. Murray, G. Tande, R. Lipkin, and M. Duffy** (1997) A floristic inventory and spatial database for Fort Wainwright, interior Alaska. U.S. Army Cold Regions Research and Engineering Laboratory, Special Report 97-23.

**U.S. Soil Conservation Service** (1994) Plants of Alaska, alphabetical listing. Report 5, U.S. Department of Agriculture, Anchorage, Alaska

**Viereck, L.A., and E.L. Little, Jr.** (1972) Alaska trees and shrubs. Agriculture Handbook No. 410. U.S. Forest Service, Washington, DC.

**Welsh, S.L.** (1974) *Anderson's Flora of Alaska and Adjacent Parts of Canada*. Provo, Utah: Brigham Young University Press.

**Williams, C.L., and R. Lipkin** (1991) Rare plants of the Steese National Conservation Area and White Mountain National Recreation Area. Unpublished report, Alaska Natural Heritage Program, Anchorage, Alaska.

## APPENDIX A: CHECKLIST OF COLLECTED VASCULAR PLANTS FROM FORT GREELY MILITARY INSTALLATION, ALASKA, ARRANGED ALPHABETICALLY

Nomenclature of this checklist follows the University of Alaska Museum Plants Database (ALABASE). Recent revisions have resulted in some name changes. If the plant name given here is different from that used in Hulten (1968), its synonym is presented in brackets; \* in front of plant name indicates that the taxon was not collected on Fort Wainwright.

- Achillea borealis* Bong.  
*Achillea millefolium* L. sensu Hulten  
*Achillea sibirica* Ledeb.  
\* *Acomastylis rossii* (R. Br.) E. Greene [= *Geum rossii* (R. Br.) Ser.]  
*Aconitum delphinifolium* DC. ssp. *delphinifolium*  
*Actaea rubra* (Ait.) Willd.  
*Adoxa moschatellina* L.  
*Agrostis scabra* Willd.  
\* *Allium schoenoprasum* L.  
\* *Alnus sinuata* (Regel) Rydb. [= *Alnus crispa* (Ait.) Pursh ssp. *sinuata* (Regel) Hulten]  
*Alnus tenuifolia* Nutt. [= *Alnus incana* (L.) Moench ssp. *tenuifolia* (Nutt.) Breitung]  
*Alnus viridis* Vill. ssp. *crispa* (Ait.) A. Love & D. Love [= *Alnus crispa* (Ait.) Pursh ssp. *crispa*]  
*Alopecurus aequalis* Sobol.  
*Andromeda polifolia* L.  
\* *Androsace chamaejasme* Wulfen ssp. *lehmanniana* (Spreng.) Hulten  
*Androsace septentrionalis* L.  
\* *Anemone drummondii* S. Wats.  
*Anemone narcissiflora* L. ssp. *interior* Hulten  
*Anemone parviflora* Michx.  
*Anemone richardsonii* Hook.  
\* *Angelica lucida* L.  
*Antennaria friesiana* (Trautv.) Ekman  
\* *Antennaria monocephala* DC. ssp. *monocephala*  
\* *Antennaria monocephala* DC. ssp. *philonipha* (A. Porsild) Hulten  
*Aquilegia brevistyla* Hook.  
*Arabis hirsuta* (L.) Scop. ssp. *pycnocarpa* (M. Hopk.) Hulten  
*Arabis lyrata* L. ssp. *kamchatica* (Fisch.) Hulten  
*Arctagrostis latifolia* (R. Br.) Griseb. ssp. *arundinacea* (Trin.) Tzvelev  
\* *Arctagrostis latifolia* (R. Br.) Griseb. ssp. *latifolia* (R. Br.) Griseb.  
*Arctophila fulva* (Trin.) Rupr. ex Anderss.  
*Arctostaphylos uva-ursi* (L.) Spreng. var *uva-ursi*  
*Arctous alpina* (L.) Niedenzu [= *Arctostaphylos alpina* (L.) Spreng.]  
*Arctous rubra* [= *Arctostaphylos rubra* (Rehd. & Wilson) Fern.]  
\* *Arenaria capillaris* Poir.  
*Arnica angustifolia* M. Vahl [= *Arnica alpina* (L.) Olin ssp. *angustifolia* (M. Vahl) Maguire]  
*Arnica griscomii* Fern. ssp. *frigida* (C.A. Mey. ex Iljin) S. J. Wolf [= *Arnica frigida* C.A. Mey. ex Iljin]  
\* *Arnica lessingii* (Torr. & Gray) Greene  
*Artemisia alaskana* Rydb.  
*Artemisia arctica* Less.  
\* *Artemisia borealis* Pallas  
*Artemisia frigida* Willd.  
\* *Artemisia globularia* Cham. ex Bess.  
*Artemisia laciniata* Willd.

*Artemisia tilesii* Ledeb. ssp. *elatior* (Torr. & Gray) Hulten  
*Aster sibiricus* L.  
*Astragalus adsurgens* Pallas ssp. *viciifolius* (Hulten) Welsh  
*Astragalus alpinus* L.  
 \* *Astragalus americanus* (Hook.) M.E. Jones  
*Astragalus bodinii* Sheldon  
 \* *Astragalus eucosmus* Robins. ssp. *eucosmus*  
 \* *Astragalus umbellatus* Bunge  
 \* *Astragalus williamsii* Rydb.  
 \* *Avena sativa* L.

*Barbarea orthoceras* Ledeb.  
*Beckmannia erucaeformis* (L.) Host ssp. *baicalensis* (Kuzn.) Hulten  
 \* *Betula glandulosa* Michx.  
*Betula hybrid*  
*Betula nana* L.  
 \* *Betula neoalaskana* Sarg. [= *Betula papyrifera* Marsh. ssp. *humilis* (Regel) Hulten]  
*Betula papyrifera* Marsh.  
*Bistorta plumosa* (Small) E. Greene [= *Polygonum bistorta* L. ssp. *plumosum* (Small) Hulten]  
*Bistorta vivipara* (L.) Gray [= *Polygonum viviparum* L.]  
*Boschniakia rossica* (Cham. & Schlecht.) Fedtsch.  
*Botrychium lunaria* (L.) Sw.  
 \* *Boykinia richardsonii* (Hook.) Rothrock  
*Bromopsis inermis* (Leyss.) Holub [= *Bromus inermis* Leyss.]  
*Bromopsis pumpelliana* (Scribn.) Holub ssp. *pumpellianus* [= *Bromus pumpellianus* Scribn. var. *pumpellianus*]  
 \* *Bupleurum triradiatum* Adams ssp. *arcticum* (Regel) Hulten

*Calamagrostis canadensis* (Michx.) Beauv.  
*Calamagrostis canadensis* (Michx.) Beauv. ssp. *canadensis*  
*Calamagrostis inexpansa* Gray  
*Calamagrostis purpurascens* R. Br.  
 \* *Callitriche hermaphroditica* L.  
*Callitriche verna* L. emend. Kutz.  
*Calypto bulbosa* (L.) Oakes  
*Campanula lasiocarpa* Cham. ssp. *lasiocarpa*  
*Campanula uniflora* L.  
 \* *Cardamine bellidifolia* L.  
 \* *Cardamine purpurea* Cham. & Schlecht.  
 \* *Cardamine umbellata* E. Greene  
*Carex aenea* Fern.  
*Carex aquatilis* Wahlenb.  
 \* *Carex aquatilis* Wahlenb. ssp. *Aquatilis*  
 \* *Carex arcta* Boott  
*Carex atherodes* Spreng.  
 \* *Carex atratiformis* Britt. ssp. *raymondii* (Calder) Pors. [= *Carex raymondii* Calder]  
 \* *Carex aura* Nutt.  
 \* *Carex bicolor* Bellardi ex All.  
*Carex bigelowii* Torr. ex Schwein.  
*Carex canescens* L.  
*Carex capillaris* L.  
*Carex capitata* L.  
*Carex concinna* R. Br.

*Carex crawfordii* Fern.  
 \* *Carex* cf. *deweyana* Schwein.  
*Carex diandra* Schrank  
*Carex disperma* Dew.  
 \* *Carex eburnea* Boott  
*Carex filifolia* Nutt.  
*Carex garberi* Fern. ssp. *bifaria* (Fern.) Hulten  
 \* *Carex gynocrates* Wormsk. ex Drej. [= *Carex dioica* L. ssp. *gynocrates* (Wormsk.) Hulten]  
 \* *Carex kelloggii* W. Boott  
*Carex krausei* Boeckl.  
 \* *Carex lachenalii* Schkuhr.  
*Carex limosa* L.  
 \* *Carex livida* (Wahlenb.) Willd.  
 \* *Carex lugens* Holm  
 \* *Carex macloviana* d'Urv. [= *Carex macloviana* d'Urv. ssp. *pachystachya* (Cham.) Hulten]  
*Carex magellanica* Lam. ssp. *irrigua* (Wahlenb.) Hulten  
*Carex media* R. Br.  
 \* *Carex membranacea* Hook.  
 \* *Carex microchaeta* Holm  
*Carex microchaeta* Holm ssp. *microchaeta*  
*Carex microchaeta* Holm ssp. *nesophila* (Holm) D. Murray  
 \* *Carex microglochin* Wahlenb.  
*Carex oederi* Retz. ssp. *viridula* (Michx.) Hulten  
 \* *Carex petricosa* Dewey  
*Carex podocarpa* R. Br.  
*Carex rostrata* Stokes  
*Carex rotundata* Wahlenb.  
*Carex* cf. *rotundata* Wahlenb.  
*Carex rupestris* All.  
*Carex saxatilis* L. ssp. *laxa* (Trautv.) Kalela  
 \* *Carex scirpoidea* Michx.  
*Carex supina* Willd. ex Wahlenb. var. *spaniocarpa* (Steud.) Boivin  
*Carex sychnocephala* Carey  
*Carex tenuiflora* Wahlenb.  
*Carex utriculata* Boott [= *Carex rhynchophysa* C. A. Meyer]  
*Carex vaginata* Tausch  
 \* *Carex williamsii* Britt.  
*Cassiope tetragona* (L.) D. Don ssp. *tetragona*  
*Castilleja caudata* (Pennell) Rebr.  
 \* *Castilleja yukonis* Pennell  
 \* *Cerastium beeringianum* Cham. & Schlecht.  
 \* *Cerastium beeringianum* Cham. & Schlecht. var. *beeringianum*  
 \* *Cerastium fontanum* Baumg.  
*Chamaedaphne calyculata* (L.) Moench  
*Chenopodium album* L.  
*Chenopodium capitatum* (L.) Aschers.  
*Chrysosplenium tetrandrum* (Lund) Th. Fries  
 \* *Chrysosplenium wrightii* Franch. & Savigny  
 \* *Claytonia sarmentosa* C.A. Mey.  
 \* *Claytonia tuberosa* Pallas ex J.A. Schultes  
*Cnidium cnidiifolium* (Turcz.) Schischk.  
*Comarum palustre* L. [= *Potentilla palustris* (L.) Scop.]  
*Corallorrhiza trifida* Chatelain  
*Cornus canadensis* L.

*Corydalis sempervirens* (L.) Pers.  
*Crepis elegans* Hook.  
 \* *Crepis nana* Richards.  
*Cryptogramma stelleri* (Gmel.) Prantl  
*Cypripedium guttatum* Sw.  
*Cypripedium passerinum* Richards.  
*Cystopteris fragilis* (L.) Bernh.  
 \* *Cystopteris fragilis* (L.) Bernh. ssp. *dickieana* (Sim) Hyl.  
 \* *Cystopteris montana* (Lam.) Bernh. ex Desv.  
  
*Delphinium glaucum* S. Wats.  
*Deschampsia cespitosa* (L.) Beauv.  
 \* *Descurainia richardsonii* (Sweet) O. Schulz  
*Descurainia sophioides* (Fisch. ex Hook.) O.E. Schulz  
*Diapensia lapponica* L. ssp. *obovata* (F.Schm.) Hulten  
 \* *Diphasiastrum alpinum* (L.) Holub [= *Lycopodium alpinum* L.]  
 \* *Diphasiastrum complanatum* (L.) Holub [= *Lycopodium complanatum* L.]  
 \* *Dodecatheon frigidum* Cham. & Schlecht.  
*Dodecatheon pulchellum* (Raf.) Merr. ssp. *pauciflorum* (E. Greene) Hulten  
 \* *Draba alpina* L. complex  
 \* *Draba cana* Rydb. [= *Draba lanceolata* Royle]  
*Draba glabella* Pursh var. *glabella* Pursh [= *Draba hirta* L.]  
 \* *Draba incerta* Payson  
 \* *Draba lonchocarpa* Rydb. var. *lonchocarpa*  
 \* *Draba longipes* Raup  
 \* *Draba nivalis* Lilj.  
 \* *Draba stenopetala* Trautv.  
*Dracocephalum parviflorum* Nutt.  
*Drosera rotundifolia* L.  
 \* *Dryas alaskensis* A. Porsild [= *Dryas octopetala* L. ssp. *alaskensis* (Porsild) Hulten]  
*Dryas drummondii* Richards. ex Hook.  
 \* *Dryas integrifolia* Vahl  
 \* *Dryas octopetala* L.  
*Dryas octopetala* L. ssp. *octopetala* var. *octopetala*  
*Dryopteris fragrans* (L.) Schott  
  
 \* *Elaeagnus commutata* Bernh. ex Rydb.  
*Eleocharis acicularis* (L.) Roem. & Schult  
*Eleocharis palustris* (L.) Roem. & Schult.  
*Elymus alaskanus* (Scribn. & Merr.) A. Love ssp. *hyperarcticus* (Polunin) A. Love & D. Love [= *Agropyron boreale* (Turcz.) Drobov ssp. *hyarcticum* (Polunin) Melderis]  
*Elymus* cf. *macrourus* (Turcz.) Tzvelev [= *Agropyron macrourum* (Turcz. ) Drobov]  
*Elymus trachycaulus* (Link) Gould ex Shinnars cf. ssp. *subsecundus* (Link) Gould [= *Agropyron subsecundum* (Link) Hitchc.]  
*Elymus trachycaulus* (Link) Gould ex Shinnars ssp. *trachycaulus* [= *Agropyron pauciflorum* Schwein.) Hitchc.]  
*Elymus trachycaulus* (Link) Gould ex Shinnars ssp. *violaceus* (Hornem.) A. & D. Love [= *Agropyron violaceum* (Hornem.) Lange]  
*Elytrigia repens* (L.) Beauv. var. *repens* [= *Agropyron repens* (L.) Beauv.]  
*Empetrum hermaphroditum* Lange ex Hagerup [= *Empetrum nigrum* L. ssp. *hermaphroditum* (Lange ex Hagerup ) Bocher]  
*Epilobium angustifolium* L.  
*Epilobium ciliatum* Raf. ssp. *adenocaulon* (Haussk.) Hoch & Raven [= *Epilobium adenocaulon* Haussk.]

*Epilobium hornemannii* Rchb. ssp. *hornemannii*  
*Epilobium latifolium* L.  
*Epilobium palustre* L.  
*Equisetum arvense* L.  
*Equisetum fluviatile* L. ampl Ehrh.  
*Equisetum palustre* L.  
*Equisetum pratense* Ehrh.  
*Equisetum scirpoides* Michx.  
*Equisetum silvaticum* L.  
*Equisetum variegatum* Schleich. ex F. Weber & D.M.H. Mohr  
*Erigeron acris* L.  
*Erigeron caespitosus* Nutt.  
*Erigeron elatus* E. Greene  
\**Erigeron eriocephalus* J. Vahl  
*Erigeron glabellus* Nutt. ssp. *pubescens* (Hook.) Cronq.  
\**Erigeron humilis* Graham  
*Erigeron lonchophyllus* Hook.  
\**Erigeron purpuratus* Greene  
*Eriophorum angustifolium* Honck. ssp. *subarcticum* (Vassiljev) Hulten  
\**Eriophorum brachyantherum* Trautv. & C.A. Mey.  
*Eriophorum gracile* W.D.J. Koch  
*Eriophorum russeolum* Fries  
*Eriophorum scheuchzeri* Hoppe  
\**Eriophorum scheuchzeri* Hoppe var. *tenuifolium* Ohwi  
*Eriophorum vaginatum* L.  
\**Eritrichium splendens* Kearney  
*Erysimum cheiranthoides* L.  
*Euphrasia disjuncta* Fern. & Wieg.  
\**Eutrema edwardsii* R. Br.  
  
*Festuca altaica* Trin.  
*Festuca brachyphylla* J.A. Schultes ex J.A. & J.H. Schultes  
\**Festuca brevissima* Yurtsev [= *Festuca ovina* L. ssp. *alaskensis* Holmen]  
\**Festuca rubra* L. sens lat.  
\**Festuca rubra* L. ssp. *richardsonii* (R. Br.) Hulten [= *Festuca rubra* L., in part]  
*Festuca saximontana* Rydb.  
\**Festuca vivipara* (L.) Smith [= "*Festuca vivipara*"]  
*Fragaria virginiana* Duchesne ssp. *glauca* (S. Wats.) Staudt  
  
*Galium boreale* L.  
*Galium brandegei* A. Gray  
*Galium trifidum* L. ssp. *trifidum*  
*Gastrolychnis affinis* (J. Vahl) Tolm. & Koznanch. [= *Melandrium affine* J. Vahl]  
\**Gastrolychnis apetala* (L.) Tolm. & Kozhanch. [= *Melandrium apetalum* (L.) Fenzl ssp. *arcticum* (E. Fries) Hulten]  
*Gastrolychnis ostenfeldii* (A. Pors.) D. Murray [= *Melandrium taimyrense* Tolm.]  
\**Gentiana algida* Pall.  
*Gentiana glauca* Pallas  
\**Gentiana prostrata* Haenke  
*Gentianella propinqua* (Richards.) J. Gillett ssp. *propinqua* (Richards.) J. Gillett [= *Gentiana propinqua* Richards. ssp. *propinqua*]  
*Gentianopsis detonsa* (Rottb.) Ma ssp. *yukonensis* (J. Gillett) J. Gillett [= *Gentiana barbata* Froel.]  
*Geocaulon lividum* (Richards.) Fern.

- Geum perincisum* Rydb. [= *Geum macrophyllum* Willd. var. *perincisum* (Rydb.) Raup]  
*Glyceria borealis* (Nash) Batchelder  
*Glyceria maxima* (Hartm.) Holmb. ssp. *grandis* (S. Wats.) Hulten  
*Glyceria pulchella* (Nash) K. Schum.  
*Gnaphalium uliginosum* L.  
*Gymnocarpium dryopteris* (L.) Newman  
*Goodyera repens* (L.) R. Br. ex Ait. f.
- Hedysarum alpinum* L.  
 \* *Hedysarum hedysaroides* (L.) Schinz & Thell.  
*Hedysarum mackenzii* Richards.  
*Hierochloe alpina* (Sw.) Roem. & Schult.  
*Hierochloe odorata* (L.) Beauv.  
*Hippuris vulgaris* L.  
*Hordeum jubatum* L.  
*Huperzia selago* (L.) Bernh. ex Mart. & Schrank [= *Lycopodium selago* L. ssp. *appressum* (Desv.) Hulten, *Huperzia haleakalensis* (Breck.) Holub in FNA (1993)]
- Iris setosa* Pallas ex Link var. *interior* E. Anders.  
 \* *Isoetes echinospora* Durieu [= *Isoetes muricata* Dur. var. *braunii* auct.]
- Juncus alpinus* Vill.  
*Juncus arcticus* Willd. ssp. *alaskanus* Hulten  
*Juncus arcticus* Willd. ssp. *ater* (Rydb.) Hulten  
 \* *Juncus biglumis* L.  
*Juncus bufonius* L.  
*Juncus castaneus* Sm. ssp. *castaneus*  
*Juncus castaneus* Sm. ssp. *leucochlamys* (Zing. ex Krecz.) Hulten  
*Juncus filiformis* L.  
*Juncus triglumis* L. ssp. *albescens* (Lange) Hulten  
*Juniperus communis* L. ssp. *nana* (Willd.) Syme
- \* *Kobresia myosuroides* (Vill.) Fiori
- \* *Lagotis glauca* Gaertn.  
*Larix laricina* (Du Roi) K. Koch  
*Ledum groenlandicum* Oeder [= *Ledum palustre* L. ssp. *groenlandicum* (Oeder) Hulten]  
*Ledum palustre* L. ssp. *decumbens* (Ait.) Hulten  
*Lepidium densiflorum* Schrad.  
 \* *Lesquerella arctica* (Wormsk. ex Hornem.) S. Wats.  
*Leymus innovatus* (Beal) Pilger [= *Elymus innovatus* Beal]  
 \* *Linnaea borealis* L. ssp. *americanus* (J. Forbes) Hulten  
*Linnaea borealis* L. ssp. *borealis* L.  
*Linum lewisii* Pursh [= *Linum perenne* L. ssp. *lewisii* (Pursh) Hulten]  
 \* *Lloydia serotina* (L.) Reichenb.  
*Loiseleuria procumbens* (L.) Desv.  
*Lomatogonium rotatum* (L.) Fries ex Fern.  
*Lupinus arcticus* S. Wats.  
 \* *Luzula arcuata* (Wahlenb.) Sw. ssp. *arcuata* (Wahlenb.) Sw.  
*Luzula confusa* Lindeberg  
*Luzula multiflora* (Retz.) Lej. ssp. *multiflora* var. *frigida* (Buch.) Sam.  
*Luzula parviflora* (Ehrh.) Desv.  
*Luzula rufescens* Fisch. ex E. Mey.  
 \* *Luzula spicata* (L.) DC.



- \* *Luzula tundricola* Gorodk.
- Lycopodium annotinum* L. ssp. *annotinum*
- Lycopodium annotinum* L. ssp. *pungens* (L. Pyl.) Hult
- \* *Lycopodium clavatum* L. var. *monostachyon* Grev. & Hook.
  
- Matricaria matricarioides* (Less.) Porter
- Mertensia paniculata* (Ait.) G. Don
- Minuartia arctica* (Stev. ex Ser.) Graebn.
- \* *Minuartia dawsonensis* (Britt.) House
- \* *Minuartia macrocarpa* (Pursh) Ostenf.
- \* *Minuartia obtusiloba* (Rydb.) House
- \* *Minuartia rossii* (R. Br.) Graebn.
- \* *Minuartia rubella* (Wahlenb.) Hiern
- Moehringia lateriflora* (L.) Fenzl
- Moneses uniflora* (L.) Gray
- Myrica gale* L.
- Myriophyllum sibiricum* Kom. [= *Myriophyllum spicatum* L.]
- \* *Myosotis alpestris* F. W. Schmidt ssp. *asiatica* Vestergr.
  
- Nuphar polysepalum* Engelm.
  
- Orthilia secunda* (L.) House [= *Pyrola secunda* L.]
- Oxycoccus microcarpus* Turcz.
- \* *Oxyria digyna* (L.) Hill
- \* *Oxytropis bryophila* (E. Greene) Yurtsev [= *Oxytropis nigrescens* (Pallas) Fisch. ex DC. ssp. *bryophila*]
- Oxytropis deflexa* (Pallas) DC. var. *foliolosa* (Hook.) Barneby
- Oxytropis deflexa* (Pallas) DC. var. *sericea* Torr. & Gray
- \* *Oxytropis maydelliana* Trautv.
- Oxytropis varians* (Rydb.) Schumann [= *Oxytropis campestris* (L.) DC. ssp. *gracilis* (Nels.) Hulten]
- \* *Oxytropis viscida* Nutt.
  
- \* *Papaver macounii* Greene
- \* *Papaver radicum* Rottb. ssp. *radicum* [= *Papaver lapponicum* (Tolm.) Nordh. ssp. *occidentale* (Lundstr.) Knaben]
- \* *Parnassia kotzebuei* Cham. ex Spreng.
- Parnassia palustris* L. ssp. *neogaea* (Fern.) Hulten
- Parrya nudicaulis* (L.) Boiss.
- Pedicularis capitata* M.F. Adams
- Pedicularis labradorica* Wirsing
- Pedicularis lanata* Cham. & Schlecht. [= *Pedicularis kanei* Durand]
- Pedicularis langsdoerffii* Fisch. ex Stev.
- \* *Pedicularis sudetica* Willd.
- \* *Pedicularis verticillata* L.
- Pentaphylloides floribunda* (Pursh) A. Love [= *Potentilla fruticosa* L.]
- Petasites frigidus* (L.) Fries
- Petasites sagittatus* (Banks ex Pursh) Gray
- Phleum pratense* L.
- \* *Phlox hoodii* Richards.
- \* *Phlox sibirica* L. ssp. *richardsonii* (Hook.) Hulten
- Picea glauca* (Moench) Voss
- Picea mariana* (P. Mill.) B.S.P.
- Pinguicula villosa* L.

\* *Pinguicula vulgaris* L.  
 \* *Plantago canescens* M.F. Adams  
   *Plantago major* L.  
   *Platanthera hyperborea* (L.) Lindl.  
   *Platanthera obtusata* (Banks ex Pursh) Lindl.  
 \* *Poa* cf. *alpigena* (Fries) Lindman  
   *Poa alpina* L.  
   *Poa annua* L.  
   *Poa arctica* R. Br. sens lat.  
   *Poa glauca* M. Vahl  
 \* *Poa lanata* Scribn. & Merr.  
 \* *Poa paucispicula* Scribn. & Merr.  
   *Poa pratensis* L.  
 \* *Poa pseudoabbreviata* Rosh.  
 \* *Poa secunda* J. Presl [= includes *Poa nevadensis* Vasey, *Poa ampla* Merrill, *Poa stenantha*, in part, *Poa scabrella* (Thurb.) Benth. and *Poa canbyi* (Scribn.) Howell]  
   *Podistera macounii* (Coult. & Rose) Mathias & Constance [= *Ligusticum mutellinoides* (Crantz) Willard ssp. *alpinum* (Ledeb.) Thell.]  
   *Polemonium acutiflorum* Willd. ex Roemer & J.A. Schultes  
 \* *Polemonium pulcherrimum* Hook.  
   *Polygonum alaskanum* (Small) W. Wight  
   *Polygonum amphibium* L.  
   *Polygonum aviculare* L.  
   *Polygonum pennsylvanicum* L. ssp. *oneillii* (Brenckle) Hulten  
   *Populus balsamifera* L. ssp. *balsamifera*  
   *Populus tremuloides* Michx.  
   *Potamogeton alpinus* Balbis  
   *Potamogeton filiformis* Pers.  
 \* *Potamogeton foliosus* Raf.  
   *Potamogeton gramineus* L.  
 \* *Potamogeton obtusifolius* Mertens & Koch  
   *Potamogeton praelongus* Wulfen  
   *Potamogeton pusillus* L. [= *Potamogeton berchtoldii* Fieb.]  
   *Potamogeton richardsonii* (Benn.) Rydb. [= *Potamogeton perfoliatus* L. ssp. *richardsonii* (Bennett) Hulten]  
   *Potamogeton zosteriformis* Fern. [= *Potamogeton zosterifolius* Schum. ssp. *zosteriformis* (Fern.) Hulten]  
 \* *Potentilla anserina* L.  
 \* *Potentilla biflora* Willd. ex Schlecht.  
   *Potentilla hookeriana* Lehm.  
   *Potentilla multifida* L.  
   *Potentilla norvegica* L. ssp. *monspeliensis* (L.) Ashers. & Graebn.  
   *Potentilla pensylvanica* L.  
   *Potentilla uniflora* Ledeb.  
   *Potentilla virgulata* A. Nels.  
 \* *Primula* cf. *egalikensis* Wormsk. ex Hornem.  
 \* *Primula eximia* Greene [= *Primula tschuktschorum* Kjellm. var. *arctica* (Koidz.) Fern.]  
   *Pulsatilla patens* (L.) P. Mill. ssp. *multifida* (Pritz.) Zamels  
   *Pyrola asarifolia* Michx.  
   *Pyrola chlorantha* Sw.  
   *Pyrola grandiflora* Radius  
 \* *Pyrola minor* L.  
  
   *Ranunculus gmelini* DC. ssp. *gmelini*

*Ranunculus hyperboreus* Rottb.  
*Ranunculus lapponicus* L.  
 \* *Ranunculus nivalis* L.  
*Ranunculus reptans* L.  
*Ranunculus sceleratus* L. ssp. *multifidus* (Nutt.) Hulten  
*Ranunculus trichophyllus* Chaix  
*Rhinanthus minor* L. ssp. *borealis* (Sterneck) Love  
 \* *Rhodiola integrifolia* Raf. [= *Sedum rosea* (L.) Scop. ssp. *integrifolium* (Raf.) Hulten]  
 \* *Rhododendron lapponicum* (L.) Wahlenb.  
*Ribes hudsonianum* Richards.  
*Ribes triste* Pallas  
*Rorippa barbareifolia* (DC.) Kitigawa [= *Rorippa hispida* (Desv.) Britt. var. *barbareaefolia* (DC.) Hulten]  
*Rorippa palustris* (L.) Besser ssp. *glabra* (O. Schulz) Stuckey [= *Rorippa islandica* (Oeder) Borb. ssp. *fernaldiana* (Butt. & Abbe) Hulten]  
*Rosa acicularis* Lindl.  
*Rubus arcticus* L. ssp. *arcticus* L.  
*Rubus chamaemorus* L.  
*Rubus idaeus* L.  
*Rumex arcticus* Trautv.  
 \* *Rumex longifolius* DC.  
 \* *Rumex maritimus* L. ssp. *fueginus* (L. Phillips) Hulten  
 \* *Rumex maritimus* L. ssp. *maritimus*  
  
 \* *Sagina nivalis* (Lindbl.) Fries [= *Sagina intermedia* Fenzl]  
 \* *Salix alaxensis* (Anderss.) Coville var. *alaxensis* (Anderss.) Coville  
*Salix alaxensis* (Anderss.) Coville var. *longistylis* (Rydb.) Schneid.  
*Salix arbusculoides* Anderss.  
*Salix arctica* Pall.  
 \* *Salix barclayi* Anderss.  
*Salix bebbiana* Sarg. [= *Salix depressa* L. ssp. *rostrata* (Anderss.) Hiitonen]  
*Salix brachycarpa* Nutt. ssp. *niphoclada* (Rydb.) Argus  
*Salix fuscescens* Anderss.  
*Salix glauca* L.  
*Salix glauca* L. var. *acutifolia* (Andersson) C. Schneider  
 \* *Salix lanata* L. ssp. *richardsonii* (Hook.) A. Skvortsov  
*Salix myrtillofolia* Anderss.  
*Salix novae-angliae* Anderss. [= *Salix myrtillofolia* Anderss., in part]  
*Salix planifolia* Pursh ssp. *pulchra* (Cham.) Argus  
 \* *Salix polaris* Wahlenb. ssp. *pseudopolaris* (Flod.) Hulten  
 \* *Salix reticulata* L.  
 \* *Salix rotundifolia* Trautv. ssp. *dodgeana* (Rydb.) Argus [= *Salix dodgeana* Rydb.]  
 \* *Salix setchelliana* Ball  
*Sanguisorba officinalis* L.  
 \* *Sanguisorba stipulata* Raf.  
*Saussurea angustifolia* (Willd.) DC. (including one specimen that fits *Saussurea viscida* Hulten var. *yukonensis* (Pors.) sensu Hulten)  
 \* *Saxifraga cf. adscendens* L. ssp. *oregonensis* (Raf.) Bacig.  
 \* *Saxifraga bronchialis* L.  
 \* *Saxifraga calycina* Stern b. [= *Saxifraga davurica* Willd. ssp. *grandipetala* (Engler & Irmsch) Hulten]  
*Saxifraga cernua* L.  
 \* *Saxifraga eschscholtzii* Sternb.  
 \* *Saxifraga flagellaris* Willd. ex Sternb.

- \* *Saxifraga hieraciifolia* Waldst. & Kit
- \* *Saxifraga hirculus* L.  
    *Saxifraga nelsoniana* D. Don [= *Saxifraga punctata* L.]
- \* *Saxifraga oppositifolia* L.  
    *Saxifraga reflexa* Hook.
- \* *Saxifraga rivularis* L.
- \* *Saxifraga serpyllifolia* Pursh
- \* *Saxifraga spicata* D. Don  
    *Saxifraga tricuspidata* Rottb.  
    *Scirpus validus* M. Vahl  
    *Selaginella sibirica* (Milde) Hieron.  
    *Senecio atropurpureus* (Ledeb.) Fedtsch.  
    *Senecio congestus* (R. Br.) DC.
- \* *Senecio kjellmannii* [= *Senecio atropurpureus* (Ledeb.) Fedtsch. ssp. *tomentosus* (Kjellm.) Hulten]  
    *Senecio lugens* Richards.
- \* *Senecio ogotorukensis* Packer [= *Senecio conterminus* Greenm.]  
    *Senecio pauciflorus* Pursh
- \* *Senecio pauperculus* Michx.
- \* *Senecio resedifolius* Less.  
    *Senecio tundricola* Tolm. [= *Senecio fuscatus* (Jord. & Fourr.) Hayek]
- \* *Senecio yukonensis* Porsild  
    *Shepherdia canadensis* (L.) Nutt.
- \* *Silene acaulis* (L.) Jacq.
- \* *Silene repens* Patrin ex Pers.  
    *Silene williamsii* Britt. [= *Silene menziesii* Hook. ssp. *williamsii* (Britt.) Hulten]
- \* *Sisyrinchium montanum* Greene  
    *Solidago decumbens* Greene var. *oreophila* (Rydb.) Fern.  
    *Solidago multiradiata* Ait.  
    *Sparganium angustifolium* Michx.  
    *Sparganium hyperboreum* Laestad. ex Beurling  
    *Sparganium minimum* (Hartman F.) Fries  
    *Spiraea stevenii* (Schneid.) Rydb. [= *Spiraea beauverdiana* Schneid.]  
    *Spiranthes romanzoffiana* Cham.
- \* *Stellaria alaskana* Hulten  
    *Stellaria borealis* Bigelow  
    *Stellaria calycantha* (Ledeb.) Bong.  
    *Stellaria crassifolia* Ehrh.
- \* *Stellaria edwardsii* R. Br.  
    *Stellaria laeta* Richardson  
    *Stellaria longifolia* Muhl. ex Willd.  
    *Stellaria longipes* Goldie
- \* *Subularia aquatica* L.  
    *Synthyris borealis* Pennell
  
- \* *Taraxacum kamtschaticum* Dahlst.
- \* *Taraxacum lacerum* E. Greene  
    *Thalictrum alpinum* L.  
    *Thalictrum sparsiflorum* Turcz. ex Fisch. & C.A. Mey.  
    *Tofieldia coccinea* Richards.
- \* *Tofieldia pusilla* (Michx.) Pers.
- \* *Torularia humilis* (C. Meyer) O. Schulz [= *Braya humilis* (C.A. Mey.) B.L. Robins.]
- \* *Trichophorum caespitosum* (L.) Hartman  
    *Trientalis europaea* L. ssp. *arctica* (Fisch. ex Hook.) Hulten

*Trifolium hybridum* L.  
*Triglochin palustre* L.  
*Trisetum spicatum* (L.) Richter

*Utricularia intermedia* Hayne  
*Utricularia minor* L.  
*Utricularia vulgaris* L. ssp. *macrorhiza* (Le Conte) R.T. Clausen

*Vaccinium uliginosum* L.  
*Vaccinium vitis-idaea* L. ssp. *minus* (Lodd.) Hulten  
*Valeriana capitata* Pallas ex Link  
\* *Veronica peregrina* L. ssp. *xalapensis* (Kunth) Pennell  
\* *Veronica wormskjoldii* Roemer & J.A. Schultes  
*Viburnum edule* (Michx.) Raf.  
*Viola biflora* L.  
*Viola epipsila* Ledeb.  
\* *Viola selkirkii* Pursh ex Goldie

*Wilhelmsia physodes* (Fisch.) McNeill  
\* *Woodsia glabella* R. Br. ex Richards.  
*Woodsia ilvensis* (L.) R. Br.

*Zigadenus elegans* Pursh

## APPENDIX B: CHECKLIST OF COLLECTED VASCULAR PLANTS FROM FORT GREELY MILITARY INSTALLATION, ALASKA, ARRANGED BY FAMILY

Nomenclature of this checklist follows the University of Alaska Museum Plants Database (ALABASE). Recent revisions have resulted in some name changes; if the plant name is different from that used in Hulten (1968), its synonym is presented in brackets.

### **Adiantaceae [including Cryptogrammaceae]**

*Cryptogramma stelleri* (Gmel.) Prantl

### **Adoxaceae**

*Adoxa moschatellina* L.

### **Apiaceae [=Umbelliferae]**

*Angelica lucida* L.

*Bupleurum triradiatum* Adams ssp. *arcticum* (Regel) Hulten

*Cnidium cnidiifolium* (Turcz.) Schischk.

*Podistera macounii* (Coult. & Rose) Mathias & Constance [= *Ligusticum mutellinioides* (Crantz) Willard ssp. *alpinum* (Ledeb.) Thell.]

### **Aspleniaceae [including Athyriaceae, Aspidiaceae]**

*Cystopteris fragilis* (L.) Bernh.

*Cystopteris fragilis* (L.) Bernh. ssp. *dickieana* (Sim) Hyl.

*Cystopteris montana* (Lam.) Bernh. ex Desv.

*Dryopteris fragrans* (L.) Schott

*Gymnocarpium dryopteris* (L.) Newman

*Woodsia glabella* R. Br. ex Richards.

*Woodsia ilvensis* (L.) R. Br.

### **Asteraceae [= Compositae]**

*Achillea borealis* Bong.

*Achillea millefolium* L. sensu Hulten

*Achillea sibirica* Ledeb.

*Antennaria friesiana* (Trautv.) Ekman

*Antennaria monocephala* DC. ssp. *monocephala*

*Antennaria monocephala* DC. ssp. *philonipha* (A. Porsild) Hulten

*Arnica angustifolia* M. Vahl [= *Arnica alpina* (L.) Olin ssp. *angustifolia* (M. Vahl) Maguire]

*Arnica griscomii* Fern. ssp. *frigida* (C.A. Mey. ex Iljin) S. J. Wolf [= *Arnica frigida* C.A. Mey. ex Iljin]

*Arnica lessingii* (Torr. & Gray) Greene

*Artemisia alaskana* Rydb.

*Artemisia arctica* Less.

*Artemisia borealis* Pallas

*Artemisia frigida* Willd.

*Artemisia globularia* Cham. ex Bess.

*Artemisia laciniata* Willd.

*Artemisia tilesii* Ledeb. ssp. *elatior* (Torr. & Gray) Hulten

*Aster sibiricus* L.

*Crepis elegans* Hook.

*Crepis nana* Richards.

*Erigeron acris* L.

*Erigeron caespitosus* Nutt.

*Erigeron elatus* E. Greene  
*Erigeron eriocephalus* J. Vahl  
*Erigeron glabellus* Nutt. ssp. *pubescens* (Hook.) Cronq.  
*Erigeron humilis* Graham  
*Erigeron lonchophyllus* Hook.  
*Erigeron purpuratus* Greene  
*Gnaphalium uliginosum* L.  
*Matricaria matricarioides* (Less.) Porter  
*Petasites frigidus* (L.) Fries  
*Petasites sagittatus* (Banks ex Pursh) Gray  
*Saussurea angustifolia* (Willd.) DC. (including one specimen that fits *Saussurea viscida* Hulten var. *yukonensis* (Pors.) *sensu* Hulten)  
*Senecio atropurpureus* (Ledeb.) Fedtsch.  
*Senecio congestus* (R. Br.) DC.  
*Senecio kjellmannii* [= *Senecio atropurpureus* (Ledeb.) Fedtsch. ssp. *tomentosus* (Kjellm.) Hulten]  
*Senecio lugens* Richards.  
*Senecio ogorukensis* Packer [= *Senecio conterminus* Greenm.]  
*Senecio pauciflorus* Pursh  
*Senecio pauperculus* Michx.  
*Senecio resedifolius* Less.  
*Senecio tundricola* Tolm. [= *Senecio fuscatus* (Jord. & Fourr.) Hayek]  
*Senecio yukonensis* Porsild  
*Solidago decumbens* Greene var. *oreophila* (Rydb.) Fern.  
*Solidago multiradiata* Ait.  
*Taraxacum kamtschaticum* Dahlst.  
*Taraxacum lacerum* E. Greene

### **Betulaceae**

*Alnus sinuata* (Regel) Rydb. [= *Alnus crispa* (Ait.) Pursh ssp. *sinuata* (Regel) Hulten]  
*Alnus tenuifolia* Nutt. [= *Alnus incana* (L.) Moench ssp. *tenuifolia* (Nutt.) Breitung]  
*Alnus viridis* Vill. ssp. *crispa* (Ait.) A. Love & D. Love [= *Alnus crispa* (Ait.) Pursh ssp. *crispa*]  
*Betula glandulosa* Michx.  
*Betula hybrid*  
*Betula nana* L.  
*Betula neoalaskana* Sarg. [= *Betula papyrifera* Marsh. ssp. *humilis* (Regel) Hulten]  
*Betula papyrifera* Marsh.

### **Boraginaceae**

*Eritrichium splendens* Kearney  
*Mertensia paniculata* (Ait.) G. Don  
*Myosotis alpestris* F. W. Schmidt ssp. *asiatica* Vesterg.

### **Brassicaceae [=Cruciferae]**

*Arabis hirsuta* (L.) Scop. ssp. *pycnocarpa* (M. Hopk.) Hulten  
*Arabis lyrata* L. ssp. *kamchatica* (Fisch.) Hulten  
*Barbarea orthoceras* Ledeb.  
*Cardamine bellidifolia* L.  
*Cardamine purpurea* Cham. & Schlecht.  
*Cardamine umbellata* E. Greene  
*Descurainia richardsonii* (Sweet) O. Schulz  
*Descurainia sophioides* (Fisch. ex Hook.) O.E. Schulz  
*Draba alpina* L. complex

*Draba cana* Rydb. [= *Draba lanceolata* Royle]  
*Draba glabella* Pursh var. *glabella* Pursh [= *Draba hirta* L.]  
*Draba incerta* Payson  
*Draba lonchocarpa* Rydb. var. *lonchocarpa*  
*Draba longipes* Raup  
*Draba nivalis* Lilj.  
*Draba stenopetala* Trautv.  
*Erysimum cheiranthoides* L.  
*Eutrema edwardsii* R. Br.  
*Lepidium densiflorum* Schrad.  
*Lesquerella arctica* (Wormsk. ex Hornem.) S. Wats.  
*Parrya nudicaulis* (L.) Boiss.  
*Rorippa barbareaefolia* (DC.) Kitigawa [= *Rorippa hispida* (Desv.) Britt. var. *barbareaefolia* (DC.) Hulten]  
*Rorippa palustris* (L.) Besser ssp. *glabra* (O. Schulz) Stuckey [= *Rorippa islandica* (Oeder) Borb. ssp. *fernaldiana* (Butt. & Abbe) Hulten]  
*Subularia aquatica* L.  
*Torularia humilis* (C. Meyer) O. Schulz [= *Braya humilis* (C.A. Mey.) B.L. Robins.]

### **Callitrichaceae**

*Callitriche hermaphroditica* L.  
*Callitriche verna* L. emend. Kutz.

### **Campanulaceae**

*Campanula lasiocarpa* Cham. ssp. *lasiocarpa*  
*Campanula uniflora* L.

### **Caprifoliaceae**

*Linnaea borealis* L. ssp. *americanus* (J. Forbes) Hulten  
*Linnaea borealis* L. ssp. *borealis* L.  
*Viburnum edule* (Michx.) Raf.

### **Caryophyllaceae**

*Arenaria capillaris* Poir.  
*Cerastium beeringianum* Cham. & Schlecht.  
*Cerastium beeringianum* Cham. & Schlecht. var. *beeringianum*  
*Cerastium fontanum* Baumg.  
*Gastrollychnis affinis* (J. Vahl) Tolm. & Koznanch. [= *Melandrium affine* J. Vahl]  
*Gastrollychnis apetala* (L.) Tolm. & Kozhanch. [= *Melandrium apetalum* (L.) Fenzl ssp. *arcticum* (E. Fries) Hulten]  
*Gastrollychnis ostenfeldii* (A. Pors.) D. Murray [= *Melandrium taimyrense* Tolm.]  
*Minuartia arctica* (Stev. ex Ser.) Graebn.  
*Minuartia dawsoneensis* (Britt.) House  
*Minuartia macrocarpa* (Pursh) Ostenf.  
*Minuartia obtusiloba* (Rydb.) House  
*Minuartia rossii* (R. Br.) Graebn.  
*Minuartia rubella* (Wahlenb.) Hiern  
*Moehringia lateriflora* (L.) Fenzl  
*Sagina nivalis* (Lindbl.) Fries [= *Sagina intermedia* Fenzl]  
*Silene acaulis* (L.) Jacq.  
*Silene repens* Patrin ex Pers.  
*Silene williamsii* Britt. [= *Silene menziesii* Hook. ssp. *williamsii* (Britt.) Hulten]  
*Stellaria alaskana* Hulten  
*Stellaria borealis* Bigelow



*Stellaria calycantha* (Ledeb.) Bong.  
*Stellaria crassifolia* Ehrh.  
*Stellaria edwardsii* R. Br.  
*Stellaria laeta* Richardson  
*Stellaria longifolia* Muhl. ex Willd.  
*Stellaria longipes* Goldie  
*Wilhelmsia physodes* (Fisch.) McNeill

#### **Chenopodiaceae**

*Chenopodium album* L.  
*Chenopodium capitatum* (L.) Aschers.

#### **Cornaceae**

*Cornus canadensis* L.

#### **Crassulaceae**

*Rhodiola integrifolia* Raf. [= *Sedum rosea* (L.) Scop. ssp. *integrifolium* (Raf.) Hulten]

#### **Cupressaceae**

*Juniperus communis* L. ssp. *nana* (Willd.) Syme

#### **Cyperaceae**

*Carex aenea* Fern.  
*Carex aquatilis* Wahlenb.  
*Carex aquatilis* Wahlenb. ssp. *aquatilis*  
*Carex arcta* Boott  
*Carex atherodes* Spreng.  
*Carex atratiformis* Britt. ssp. *raymondii* (Calder) Pors. [= *Carex raymondii* Calder]  
*Carex aurea* Nutt.  
*Carex bicolor* Bellardi ex All.  
*Carex bigelowii* Torr. ex Schwein.  
*Carex canescens* L.  
*Carex capillaris* L.  
*Carex capitata* L.  
*Carex concinna* R. Br.  
*Carex crawfordii* Fern.  
*Carex* cf. *deweyana* Schwein.  
*Carex diandra* Schrank  
*Carex disperma* Dew.  
*Carex eburnea* Boott  
*Carex filifolia* Nutt.  
*Carex garberi* Fern. ssp. *bifaria* (Fern.) Hulten  
*Carex gynocrates* Wormsk. ex Drej. [= *Carex dioica* L. ssp. *gynocrates* (Wormsk.) Hulten]  
*Carex kelloggii* W. Boott  
*Carex krausei* Boeckl.  
*Carex lachenalii* Schkuhr.  
*Carex limosa* L.  
*Carex livida* (Wahlenb.) Willd.  
*Carex lugens* Holm  
*Carex macloviana* d'Urv. [= *Carex macloviana* d'Urv. ssp. *pachystachya* (Cham.) Hulten]  
*Carex magellanica* Lam. ssp. *irrigua* (Wahlenb.) Hulten  
*Carex media* R. Br.

*Carex membranacea* Hook.  
*Carex microchaeta* Holm  
*Carex microchaeta* Holm ssp. *microchaeta*  
*Carex microchaeta* Holm ssp. *nesophila* (Holm) D. Murray  
*Carex microglochin* Wahlenb.  
*Carex oederi* Retz. ssp. *viridula* (Michx.) Hulten  
*Carex petricosa* Dewey  
*Carex podocarpa* R. Br.  
*Carex rostrata* Stokes  
*Carex rotundata* Wahlenb.  
*Carex* cf. *rotundata* Wahlenb.  
*Carex rupestris* All.  
*Carex saxatilis* L. ssp. *laxa* (Trautv.) Kalela  
*Carex scirpoidea* Michx.  
*Carex supina* Willd. ex Wahlenb. var. *spaniocarpa* (Steud.) Boivin  
*Carex sychnocephala* Carey  
*Carex tenuiflora* Wahlenb.  
*Carex utriculata* Boott [= *Carex rhynchophysa* C. A. Meyer]  
*Carex vaginata* Tausch  
*Carex williamsii* Britt.  
*Eleocharis acicularis* (L.) Roem. & Schult  
*Eleocharis palustris* (L.) Roem. & Schult.  
*Eriophorum angustifolium* Honck. ssp. *subarcticum* (Vassiljev) Hulten  
*Eriophorum brachyantherum* Trautv. & C.A. Mey.  
*Eriophorum gracile* W.D.J. Koch  
*Eriophorum russeolum* Fries  
*Eriophorum scheuchzeri* Hoppe  
*Eriophorum scheuchzeri* Hoppe var. *tenuifolium* Ohwi  
*Eriophorum vaginatum* L.  
*Kobresia myosuroides* (Vill.) Fiori  
*Scirpus validus* M. Vahl  
*Trichophorum caespitosum* (L.) Hartman

#### **Diapensiaceae**

*Diapensia lapponica* L. ssp. *obovata* (F.Schm.) Hulten

#### **Droseraceae**

*Drosera rotundifolia* L.

#### **Elaeagnaceae**

*Elaeagnus commutata* Bernh. ex Rydb.  
*Shepherdia canadensis* (L.) Nutt.

#### **Empetraceae**

*Empetrum hermaphroditum* Lange ex Hagerup [= *Empetrum nigrum* L. ssp.  
*hermaphroditum* (Lange ex Hagerup) Bocher]

#### **Equisetaceae**

*Equisetum arvense* L.  
*Equisetum fluviatile* L. ampl Ehrh.  
*Equisetum palustre* L.  
*Equisetum pratense* Ehrh.  
*Equisetum scirpoides* Michx.  
*Equisetum silvaticum* L.  
*Equisetum variegatum* Schleich. ex F. Weber & D.M.H. Mohr

### **Ericaceae**

*Andromeda polifolia* L.  
*Arctostaphylos uva-ursi* (L.) Spreng. var *uva-ursi*  
*Arctous alpina* (L.) Niedenzu [= *Arctostaphylos alpina* (L.) Spreng.]  
*Arctous rubra* [= *Arctostaphylos rubra* (Rehd. & Wilson) Fern.]  
*Cassiope tetragona* (L.) D. Don ssp. *tetragona*  
*Chamaedaphne calyculata* (L.) Moench  
*Ledum groenlandicum* Oeder [= *Ledum palustre* L. ssp. *groenlandicum* (Oeder) Hulten]  
*Ledum palustre* L. ssp. *decumbens* (Ait.) Hulten  
*Loiseleuria procumbens* (L.) Desv.  
*Oxycoccus microcarpus* Turcz.  
*Rhododendron lapponicum* (L.) Wahlenb.  
*Vaccinium uliginosum* L.  
*Vaccinium vitis-idaea* L. ssp. *minus* (Lodd.) Hulten

### **Fabaceae [= Leguminosae]**

*Astragalus adsurgens* Pallas ssp. *viciifolius* (Hulten) Welsh  
*Astragalus alpinus* L.  
*Astragalus americanus* (Hook.) M.E. Jones  
*Astragalus bodinii* Sheldon  
*Astragalus eucosmus* Robins. ssp. *eucosmus*  
*Astragalus umbellatus* Bunge  
*Astragalus williamsii* Rydb.  
*Hedysarum alpinum* L.  
*Hedysarum hedysaroides* (L.) Schinz & Thell.  
*Hedysarum mackenzii* Richards.  
*Lupinus arcticus* S. Wats.  
*Oxytropis bryophila* (E. Greene) Yurtsev [= *Oxytropis nigrescens* (Pallas) Fisch. ex DC. ssp. *bryophila*]  
*Oxytropis deflexa* (Pallas) DC. var. *foliolosa* (Hook.) Barneby  
*Oxytropis deflexa* (Pallas) DC. var. *sericea* Torr. & Gray  
*Oxytropis maydelliana* Trautv.  
*Oxytropis varians* (Rydb.) Schumann [= *Oxytropis campestris* (L.) DC. ssp. *gracilis* (Nels.) Hulten]  
*Oxytropis viscida* Nutt.  
*Trifolium hybridum* L.

### **Fumariaceae**

*Corydalis sempervirens* (L.) Pers.

### **Gentianaceae**

*Gentiana algida* Pall.  
*Gentiana glauca* Pallas  
*Gentiana prostrata* Haenke  
*Gentianella propinqua* (Richards.) J. Gillett ssp. *propinqua* (Richards.) J. Gillett [= *Gentiana propinqua* Richards. ssp. *propinqua*]  
*Gentianopsis detonsa* (Rottb.) Ma ssp. *yukonensis* (J. Gillett) J. Gillett [= *Gentiana barbata* Froel.]  
*Lomatogonium rotatum* (L.) Fries ex Fern.

### **Grossulariaceae [= Saxifragaceae, in part]**

*Ribes hudsonianum* Richards.  
*Ribes triste* Pallas

**Haloragaceae**

*Hippuris vulgaris* L.

*Myriophyllum sibiricum* Kom. [= *Myriophyllum spicatum* L.]

**Iridaceae**

*Iris setosa* Pallas ex Link var. *interior* E. Anders.

*Sisyrinchium montanum* Greene

**Isoetaceae**

*Isoetes echinospora* Durieu [= *Isoetes muricata* Dur. var. *braunii* auct.]

**Juncaceae**

*Juncus alpinus* Vill.

*Juncus arcticus* Willd. ssp. *alaskanus* Hulten

*Juncus arcticus* Willd. ssp. *ater* (Rydb.) Hulten

*Juncus biglumis* L.

*Juncus bufonius* L.

*Juncus castaneus* Sm. ssp. *castaneus*

*Juncus castaneus* Sm. ssp. *leucochlamys* (Zing. ex Krecz.) Hulten

*Juncus filiformis* L.

*Juncus triglumis* L. ssp. *albescens* (Lange) Hulten

*Luzula arcuata* (Wahlenb.) Sw. ssp. *arcuata* (Wahlenb.) Sw.

*Luzula confusa* Lindeberg

*Luzula multiflora* (Retz.) Lej. ssp. *multiflora* var. *frigida* (Buch.) Sam.

*Luzula parviflora* (Ehrh.) Desv.

*Luzula rufescens* Fisch. ex E. Mey.

*Luzula spicata* (L.) DC.

*Luzula tundricola* Gorodk.

**Juncaginaceae**

*Triglochin palustre* L.

**Lamiaceae**

*Dracocephalum parviflorum* Nutt.

**Lentibulariaceae**

*Pinguicula villosa* L.

*Pinguicula vulgaris* L.

*Utricularia intermedia* Hayne

*Utricularia minor* L.

*Utricularia vulgaris* L. ssp. *macrorhiza* (Le Conte) R.T. Clausen

**Liliaceae**

*Allium schoenoprasum* L.

*Lloydia serotina* (L.) Reichenb.

*Tofieldia coccinea* Richards.

*Tofieldia pusilla* (Michx.) Pers.

*Zigadenus elegans* Pursh

**Linaceae**

*Linum lewisii* Pursh [= *Linum perenne* L. ssp. *lewisii* (Pursh) Hulten]

**Lycopodiaceae**

*Diphasiastrum alpinum* (L.) Holub [= *Lycopodium alpinum* L.]

*Diphasiastrum complanatum* (L.) Holub [= *Lycopodium complanatum* L.]  
*Huperzia selago* (L.) Bernh. ex Mart. & Schrank [= *Lycopodium selago* L. ssp.  
*appressum* (Desv.) Hulten, *Huperzia haleakalensis* (Breck.) Holub in FNA (1993)]  
*Lycopodium annotinum* L. ssp. *annotinum*  
*Lycopodium annotinum* L. ssp. *pungens* (LA Pyl.) Hult  
*Lycopodium clavatum* L. var. *monostachyon* Grev. & Hook.

#### **Myricaceae**

*Myrica gale* L.

#### **Nymphaeaceae**

*Nuphar polysepalum* Engelm.

#### **Onagraceae**

*Epilobium angustifolium* L.  
*Epilobium ciliatum* Raf. ssp. *adenocaulon* (Haussk.) Hoch & Raven [= *Epilobium*  
*adenocaulon* Haussk.]  
*Epilobium hornemannii* Rchb. ssp. *hornemannii*  
*Epilobium latifolium* L.  
*Epilobium palustre* L.

#### **Ophioglossaceae**

*Botrychium lunaria* (L.) Sw.

#### **Orchidaceae**

*Calypso bulbosa* (L.) Oakes  
*Corallorrhiza trifida* Chatelain  
*Cypripedium guttatum* Sw.  
*Cypripedium passerinum* Richards.  
*Goodyera repens* (L.) R. Br. ex Ait. f.  
*Platanthera hyperborea* (L.) Lindl.  
*Platanthera obtusata* (Banks ex Pursh) Lindl.  
*Spiranthes romanzoffiana* Cham.

#### **Orobanchaceae**

*Boschniakia rossica* (Cham. & Schlecht.) Fedtsch.

#### **Papaveraceae**

*Papaver macounii* Greene  
*Papaver radicum* Rottb. ssp. *radicum* [= *Papaver lapponicum* (Tolm.) Nordh. ssp.  
*occidentale* (Lundstr.) Knaben]

#### **Pinaceae**

*Larix laricina* (Du Roi) K. Koch  
*Picea glauca* (Moench) Voss  
*Picea mariana* (P. Mill.) B.S.P.

#### **Plantaginaceae**

*Plantago canescens* M.F. Adams  
*Plantago major* L.

#### **Poaceae [=Graminae]**

*Agrostis scabra* Willd.

*Alopecurus aequalis* Sobol.  
*Arctagrostis latifolia* (R. Br.) Griseb. ssp. *arundinacea* (Trin.) Tzvelev  
*Arctagrostis latifolia* (R. Br.) Griseb. ssp. *latifolia* (R. Br.) Griseb.  
*Arctophila fulva* (Trin.) Rupr. ex Anderss.  
*Avena sativa* L.  
*Beckmannia erucaeformis* (L.) Host ssp. *baicalensis* (Kuzn.) Hulten  
*Bromopsis inermis* (Leyss.) Holub [= *Bromus inermis* Leyss.]  
*Bromopsis pumpelliana* (Scribn.) Holub ssp. *pumpellianus* [= *Bromus pumpellianus* Scribn. var. *pumpellianus*]  
*Calamagrostis canadensis* (Michx.) Beauv.  
*Calamagrostis canadensis* (Michx.) Beauv. ssp. *canadensis*  
*Calamagrostis inexpansa* Gray  
*Calamagrostis purpurascens* R. Br.  
*Deschampsia cespitosa* (L.) Beauv.  
*Elymus alaskanus* (Scribn. & Merr.) A. Love ssp. *hyperarcticus* (Polunin) A. Love & D. Love [= *Agropyron boreale* (Turcz.) Drobov ssp. *hyparcticum* (Polunin) Melderis]  
*Elymus* cf. *macrourus* (Turcz.) Tzvelev [= *Agropyron macrourum* (Turcz.) Drobov]  
*Elymus trachycaulus* (Link) Gould ex Shinnars cf. ssp. *subsecundus* (Link) Gould [= *Agropyron subsecundum* (Link) Hitchc.]  
*Elymus trachycaulus* (Link) Gould ex Shinnars ssp. *trachycaulus* [= *Agropyron pauciflorum* (Schwein.) Hitchc.]  
*Elymus trachycaulus* (Link) Gould ex Shinnars ssp. *violaceus* (Hornem.) A. & D. Love [= *Agropyron violaceum* (Hornem.) Lange]  
*Elytrigia repens* (L.) Beauv. var. *repens* [= *Agropyron repens* (L.) Beauv.]  
*Festuca altaica* Trin.  
*Festuca brachyphylla* J.A. Schultes ex J.A. & J.H. Schultes  
*Festuca brevissima* Yurtsev [= *Festuca ovina* L. ssp. *alaskensis* Holmen]  
*Festuca rubra* L. sens lat.  
*Festuca rubra* L. ssp. *richardsonii* (R. Br.) Hulten [= *Festuca rubra* L., in part]  
*Festuca saximontana* Rydb.  
*Festuca vivipara* (L.) Smith [= "*Festuca vivipara*"]  
*Glyceria borealis* (Nash) Batchelder  
*Glyceria maxima* (Hartm.) Holmb. ssp. *grandis* (S. Wats.) Hulten  
*Glyceria pulchella* (Nash) K. Schum.  
*Hierochloa alpina* (Sw.) Roem. & Schult.  
*Hierochloa odorata* (L.) Beauv.  
*Hordeum jubatum* L.  
*Leymus innovatus* (Beal) Pilger [= *Elymus innovatus* Beal]  
*Phleum pratense* L.  
*Poa* cf. *alpigena* (Fries) Lindman  
*Poa alpina* L.  
*Poa annua* L.  
*Poa arctica* R. Br. sens lat.  
*Poa glauca* M. Vahl  
*Poa lanata* Scribn. & Merr.  
*Poa paucispicula* Scribn. & Merr.  
*Poa pratensis* L.  
*Poa pseudoabbreviata* Rosh.  
*Poa secunda* J. Presl [= includes *Poa nevadensis* Vasey, *Poa ampla* Merrill, *Poa stenantha*, in part, *Poa scabrella* (Thurb.) Benth. and *Poa canbyi* (Scribn.) Howell]  
*Trisetum spicatum* (L.) Richter

**Polemoniaceae**

*Phlox hoodii* Richards.

*Phlox sibirica* L. ssp. *richardsonii* (Hook.) Hulten

*Polemonium acutiflorum* Willd. ex Roemer & J.A. Schultes

*Polemonium pulcherrimum* Hook.

**Polygonaceae**

*Bistorta plumosa* (Small) E. Greene [= *Polygonum bistorta* L. ssp. *plumosum* (Small) Hulten]

*Bistorta vivipara* (L.) Gray [= *Polygonum viviparum* L.]

*Oxyria digyna* (L.) Hill

*Polygonum alaskanum* (Small) W. Wight

*Polygonum amphibium* L.

*Polygonum aviculare* L.

*Polygonum pennsylvanicum* L. ssp. *oneillii* (Brenckle) Hulten

*Rumex arcticus* Trautv.

*Rumex longifolius* DC.

*Rumex maritimus* L. ssp. *fueginus* (L. Phillips) Hulten

*Rumex maritimus* L. ssp. *maritimus*

**Portulacaceae**

*Claytonia sarmentosa* C.A. Mey.

*Claytonia tuberosa* Pallas ex J.A. Schultes

**Potamogetonaceae**

*Potamogeton alpinus* Balbis

*Potamogeton filiformis* Pers.

*Potamogeton foliosus* Raf.

*Potamogeton gramineus* L.

*Potamogeton obtusifolius* Mertens & Koch

*Potamogeton praelongus* Wulfen

*Potamogeton pusillus* L. [= *Potamogeton berchtoldii* Fieb.]

*Potamogeton richardsonii* (Benn.) Rydb. [= *Potamogeton perfoliatus* L. ssp. *richardsonii* (Bennett) Hulten]

*Potamogeton zosteriformis* Fern. [= *Potamogeton zosterifolius* Schum. ssp. *zosteriformis* (Fern.) Hulten]

**Primulaceae**

*Androsace chamaejasme* Wulfen ssp. *lehmanniana* (Spreng.) Hulten

*Androsace septentrionalis* L.

*Dodecatheon frigidum* Cham. & Schlecht.

*Dodecatheon pulchellum* (Raf.) Merr. ssp. *pauciflorum* (E. Greene) Hulten

*Primula* cf. *egaliksensis* Wormsk. ex Hornem.

*Primula eximia* Greene [= *Primula tschuktschorum* Kjellm. var. *arctica* (Koidz.) Fern.]

*Trientalis europaea* L. ssp. *arctica* (Fisch. ex Hook.) Hulten

**Pyrolaceae**

*Moneses uniflora* (L.) Gray

*Orthilia secunda* (L.) House [= *Pyrola secunda* L.]

*Pyrola asarifolia* Michx.

*Pyrola chlorantha* Sw.

*Pyrola grandiflora* Radius

*Pyrola minor* L.

### **Ranunculaceae**

*Aconitum delphinifolium* DC. ssp. *delphinifolium*  
*Actaea rubra* (Ait.) Willd.  
*Anemone drummondii* S. Wats.  
*Anemone narcissiflora* L. ssp. *interior* Hulten  
*Anemone parviflora* Michx.  
*Anemone richardsonii* Hook.  
*Aquilegia brevistyla* Hook.  
*Delphinium glaucum* S. Wats.  
*Pulsatilla patens* (L.) P. Mill. ssp. *multifida* (Pritz.) Zamels  
*Ranunculus gmelini* DC. ssp. *gmelini*  
*Ranunculus hyperboreus* Rottb.  
*Ranunculus lapponicus* L.  
*Ranunculus nivalis* L.  
*Ranunculus reptans* L.  
*Ranunculus sceleratus* L. ssp. *multifidus* (Nutt.) Hulten  
*Ranunculus trichophyllus* Chaix  
*Thalictrum alpinum* L.  
*Thalictrum sparsiflorum* Turcz. ex Fisch. & C.A. Mey.

### **Rosaceae**

*Acomastylis rossii* (R. Br.) E. Greene [= *Geum rossii* (R. Br.) Ser.]  
*Comarum palustre* L. [= *Potentilla palustris* (L.) Scop.]  
*Dryas alaskensis* A. Porsild [= *Dryas octopetala* L. ssp. *alaskensis* (Porsild) Hulten]  
*Dryas drummondii* Richards. ex Hook.  
*Dryas integrifolia* Vahl  
*Dryas octopetala* L.  
*Dryas octopetala* L. ssp. *octopetala* var. *octopetala*  
*Fragaria virginiana* Duchesne ssp. *glauc*a (S. Wats.) Staudt  
*Geum perincisum* Rydb. [= *Geum macrophyllum* Willd. var. *perincisum* (Rydb.) Raup]  
*Pentaphylloides floribunda* (Pursh) A. Love [= *Potentilla fruticosa* L.]  
*Potentilla anserina* L.  
*Potentilla biflora* Willd. ex Schlecht.  
*Potentilla hookeriana* Lehm.  
*Potentilla multifida* L.  
*Potentilla norvegica* L. ssp. *monspeliensis* (L.) Ashers. & Graebn.  
*Potentilla pensylvanica* L.  
*Potentilla uniflora* Ledeb.  
*Potentilla virgulata* A. Nels.  
*Rosa acicularis* Lindl.  
*Rubus arcticus* L. ssp. *arcticus* L.  
*Rubus chamaemorus* L.  
*Rubus idaeus* L.  
*Sanguisorba officinalis* L.  
*Sanguisorba stipulata* Raf.  
*Spiraea stevenii* (Schneid.) Rydb. [= *Spiraea beauverdiana* Schneid.]

### **Rubiaceae**

*Galium boreale* L.  
*Galium brandegei* A. Gray  
*Galium trifidum* L. ssp. *trifidum*

### **Salicaceae**

*Populus balsamifera* L. ssp. *balsamifera*



*Populus tremuloides* Michx.  
*Salix alaxensis* (Anderss.) Coville var. *alaxensis* (Anderss.) Coville  
*Salix alaxensis* (Anderss.) Coville var. *longistylis* (Rydb.) Schneid.  
*Salix arbusculoides* Anderss.  
*Salix arctica* Pall.  
*Salix barclayi* Anderss.  
*Salix bebbiana* Sarg. [= *Salix depressa* L. ssp. *rostrata* (Anderss.) Hiitonen]  
*Salix brachycarpa* Nutt. ssp. *niphoclada* (Rydb.) Argus  
*Salix fuscescens* Anderss.  
*Salix glauca* L.  
*Salix glauca* L. var. *acutifolia* (Andersson) C. Schneider  
*Salix lanata* L. ssp. *richardsonii* (Hook.) A. Skvortsov  
*Salix myrtillofolia* Anderss.  
*Salix novae-angliae* Anderss. [= *Salix myrtillofolia* Anderss., in part]  
*Salix planifolia* Pursh ssp. *pulchra* (Cham.) Argus  
*Salix polaris* Wahlenb. ssp. *pseudopolaris* (Flod.) Hulten  
*Salix reticulata* L.  
*Salix rotundifolia* Trautv. ssp. *dodgeana* (Rydb.) Argus [= *Salix dodgeana* Rydb.]  
*Salix setchelliana* Ball

### **Santalaceae**

*Geocaulon lividum* (Richards.) Fern.

### **Saxifragaceae**

*Boykinia richardsonii* (Hook.) Rothrock  
*Chrysosplenium tetrandrum* (Lund) Th. Fries  
*Chrysosplenium wrightii* Franch. & Savigny  
*Parnassia kotzebuei* Cham. ex Spreng.  
*Parnassia palustris* L. ssp. *neogaea* (Fern.) Hulten  
*Saxifraga* cf. *adscendens* L. ssp. *oregonensis* (Raf.) Bacig.  
*Saxifraga bronchialis* L.  
*Saxifraga calycina* Sternb. [= *Saxifraga davurica* Willd. ssp. *grandipetala* (Engler & Irmsch) Hulten]  
*Saxifraga cernua* L.  
*Saxifraga eschscholtzii* Sternb.  
*Saxifraga flagellaris* Willd. ex Sternb.  
*Saxifraga hieracifolia* Waldst. & Kit  
*Saxifraga hirculus* L.  
*Saxifraga nelsoniana* D. Don [= *Saxifraga punctata* L.]  
*Saxifraga oppositifolia* L.  
*Saxifraga reflexa* Hook.  
*Saxifraga rivularis* L.  
*Saxifraga serpyllifolia* Pursh  
*Saxifraga spicata* D. Don  
*Saxifraga tricuspidata* Rottb.

### **Scrophulariaceae**

*Castilleja caudata* (Pennell) Rebr.  
*Castilleja yukonis* Pennell  
*Euphrasia disjuncta* Fern. & Wieg.  
*Lagotis glauca* Gaertn.  
*Pedicularis capitata* M.F. Adams  
*Pedicularis labradorica* Wirsing  
*Pedicularis lanata* Cham. & Schlecht. [= *Pedicularis kanei* Durand]

*Pedicularis langsдорffii* Fisch. ex Stev.  
*Pedicularis sudetica* Willd.  
*Pedicularis verticillata* L.  
*Rhinanthus minor* L. ssp. *borealis* (Sterneck) Love  
*Synthyris borealis* Pennell  
*Veronica peregrina* L. ssp. *xalapensis* (Kunth) Pennell  
*Veronica wormskjoldii* Roemer & J.A. Schultes

**Selaginellaceae**

*Selaginella sibirica* (Milde) Hieron.

**Sparganiaceae**

*Sparganium angustifolium* Michx.  
*Sparganium hyperboreum* Laestad. ex Beurling  
*Sparganium minimum* (Hartman F.) Fries

**Valerianaceae**

*Valeriana capitata* Pallas ex Link

**Violaceae**

*Viola biflora* L.  
*Viola epipsila* Ledeb.  
*Viola selkirkii* Pursh ex Goldie

**APPENDIX C: COLLECTIONS AT ALA FOR BIG DELTA AND MT. HAYES AREA  
QUADRANGLES (ALA 1997) BUT NOT FOUND ON THE PRESENT INVENTORY  
OF FORT GREELY**

*Antennaria pulcherrima* (Hook.) Greene  
*Antennaria rosea* Greene ssp. *arida* (E. Nels.) Bayer  
*Artemisia laciniatifolia* Kom.  
*Aster alpinus* L.  
*Aster junciformis* Rydb.  
*Astragalus robbinsii* (Oakes) Gray  
*Braya bartlettiana* Jordal  
*Calla palustris* L.  
*Caltha palustris* L.  
*Cardamine pratensis* L.  
*Carex buxbaumii* Wahlenb.  
*Carex lasiocarpa* Ehrh.  
*Carex maritima* Gunn.  
*Carex obtusata* Lilj.  
*Carex rossii* Boott  
*Castilleja elegans* Malte  
*Cerastium maximum* L.  
*Cicuta virosa* L. [= *C. mackenzieana* Raup]  
*Cornus suecica* L.  
*Elymus alaskanus* (Scribn. & Merr.) A. Love ssp. *latiglumis* (Scribn. & J.G. Sm.) A. Love  
 [= *Agropyron violaceum* (Hornem.) Lange ssp. *violaceum*]  
*Elytrigia spicata* (Pursh) D. R. Dewey [= *Agropyron spicatum* (Pursh.) Scribn. & Smith]  
*Equisetum hiemale* L.  
*Erigeron alpinus* Hook. [= *E. acris* L., in part?]  
*Galium triflorum* Michx.  
*Kobresia simpliciuscula* (Wahlenb.) Mackenzie  
*Koeleria gracilis* Pers.  
*Lemna minor* L.  
*Lemna trisulca* L.  
*Listera borealis* Morong  
*Luzula kjellmaniana* Miyabe & Kudo  
*Menyanthes trifoliata* L.  
*Mimulus guttatus* DC.  
*Oxytropis gorodkovii* Yurtsev [= *Oxytropis nigrescens* (Pall.) Fisch. group]  
*Oxytropis splendens* Dougl. ex Hook.  
*Oxytropis tananensis* Yurtsev [= *Oxytropis campestris* (L.) DC. ssp. *gracilis* (Nels.)  
 Hulten, in part]  
*Papaver lapponicum* (Tolm.) Nordh.  
*Papaver nudicaule* L.  
*Papaver nudicaule* L. ssp. *americanum* Randel ex Murray  
*Pedicularis oederi* Vahl ex Hornem.  
*Penstemon gormanii* Greene  
*Phacelia mollis* J.F. Macbr.  
*Polygonum convolvulus* L.  
*Potamogeton vaginatus* Turcz.  
*Potentilla furcata* A. E. Porsild [= *Potentilla hookeriana* Lehm. ssp. *hookeriana* var.  
*furcata* (Pors.) Hulten]  
*Primula incana* M.E. Jones  
*Ranunculus eschscholtzii* Schlecht.  
*Sagittaria cuneata* Sheldon

*Salix athabascensis* Raup  
*Salix candida* Fluegge ex Willd.  
*Salix interior* Rowlee  
*Salix pseudomonticola* C. Ball  
*Salix scouleriana* Barratt ex Hook.  
*Senecio streptanthifolius* E. Greene [= *S. cymbalariodes* Nutt, sensu Hulten, in part]  
*Senecio streptanthifolius* E. Greene var. *kluanei* Bain [= *S. cymbalariodes* Nutt, sensu Hulten, in part]  
*Swida stolonifera* (Michx.) Rydb. [= *Cornus stolonifera* Michx.]  
*Triglochin maritimum* L.  
*Urtica dioica* L.  
*Valeriana sitchensis* Bong.  
*Woodsia alpina* (Bolton) S.F. Gray

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14. ABSTRACT  This inventory of the vascular flora of Fort Greely in interior Alaska was conducted sporadically during summer 1996, 1997, and 1998. Fort Greely covers 0.66 million acres (267,763 ha) and is composed of five major subdivisions: 1) the large floodplains of Jarvis Creek, the Delta River, Delta Creek, and Little Delta River, 2) the surrounding lowlands associated with these rivers, 3) several glacial moraines, 4) two highland areas (Molybdenum Ridge and Dinosaur Ridge), and 5) the higher mountains of the Alaska Range (up to 2000 m in elevation) along the southern edge of the base. Habitats range from very dry south-facing slopes to forest, floodplains, wetlands, and alpine tundra. About 100 sites were visited and 723 collections made, which represented 497 taxa of vascular plants from 64 families and 198 genera. A species list for the Fort Greely survey was compiled and is presented here. It is estimated that the vascular plant inventory is relatively complete. The inventory includes 21 rare species being tracked by the Alaska Natural Heritage Program and 11 species representing significant range extensions (>150 km). The relationship of the Fort Greely flora to that inventoried on Fort Wainwright is discussed.					
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